

#### 15 Years Success

based on innovation and high quality products

#### Who are we

 Our company started 1999 with development and manufacturing of a brand new, patented generation of cryo pumps which excelled on the market due to their special innovations.





#### Who we are

In April 2001 **HSR KRYOTECHNIK** was founded by Mr. Marcel Kohler and Mr. Herbert Vogt in Balzers, Principality of Liechtenstein.

In 2003 **HSR KRYOTECHNIK** expanded their product range and took over the business field of Diffusion and UHV-High Vacuum Pumps from company INFICON (formerly BALZERS INSTRUMENTS).





# Who we are

As a result of this expansion of the product portfolio, HSR Kryotechnik AG was renamed **HSR AG** in 2003.





High Speed Refrigeration



#### Who we are

The product portfolio was optimally supplemented by the acquisition of business fields High Vacuum Angle and Plates Valves from company INFICON in May 2008.







# Product range

- Cryogenic Pumps and Cryogenic Devices
- Oil diffusion pumps and accessories
- <u>Titanium Sublimation pumps</u> and accessories
- High Vacuum Valves
- Complete <u>Pump Sets</u> including <u>pump set controller</u>
- Engineering and manufacturing of customized special devices



## Cryocenic products

**VCP Cryo Pumps** 

















**VELCO Sputter Pumps** 



**Customized Devices** 



## **Diffusion pumps**



**DN 040** 



DN 063 - 250



DN 320 - 1000



# **High vacuum valves**

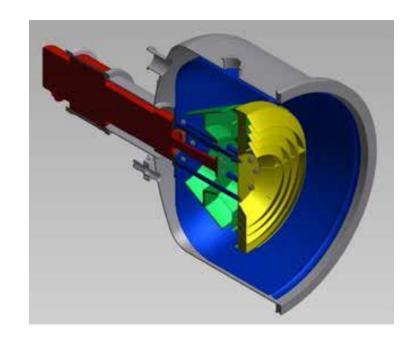






### Advantages HSR cryo technology

- Low-vibration cooling systems
- Optimized design allows operation at process temperatures up to 380 °C and high gas loads at the same time without especial heat protection
- Powerful cooling permits maximum operating time without regeneration
- Patented geometry provides outstanding uptimes and short regeneration times
- Optimized chevrons and panels
- Maximized surface for activated charcoal
- Reduced cool-down time
- Highest manufacturing quality

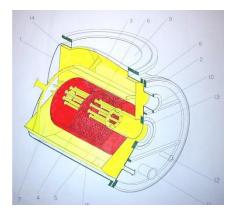




# VCP cryo pumps DN 100 - DN 200



Our patented pump design provides a 25%
higher pump speed and capacity compared with
another cryo pump equipped with same high
vacuum flange!





### VELCO cryo pumps DN 250 - DN 1250



- Its optimized design allows operating under tough conditions, e.g. temperatures up to 380°C and high gas loads at the same time
- Our patented geometry provides outstanding up-times and short regeneration times
- Powerful cooling capacity allows longest operating times without regeneration



# Coating application











#### VELCO sputter pumps DN250 - DN400

- Developed for applications with high gas loads (process pressure 10<sup>-03</sup> range) and
- long periods of operation without regeneration (10 days à 24-hour operation)
- Equipped with a new, patented technology to prevent the so-called "memory effect".
- High cooling capacity offers comprehensive thermal stability.
- Optimized design which permits operation with high gas loads exceeding 1250 sccm.
- Insensitive to intrusion of air or gas.

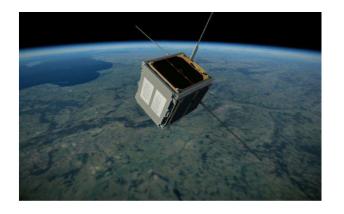
patented





## Space simulation application





- Satellite thruster testing
- Thermal testing
- Experimental testing





# **HSR VELCO cryo pumps**



**VELCO 502** 



**VELCO 900** 



**VELCO 1250** 



# **HSR LN<sub>2</sub> cooled cryo pumps**



**VELCO 800 LN2** 



**VELCO 900 LN2** 



**VELCO 1250 LN2** 



# Thruster testing











### **HSR Xenon cryo pumps**



**VELCO 402 Xe** 



VELCO 632 Xe



**VELCO 1250 Xe** 

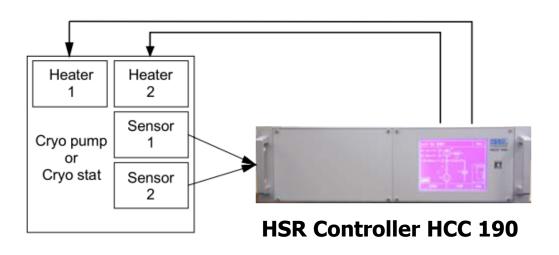


#### Temperature controlled cryo devices





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- Can be used for cryo pumps and cryostats
- Control accuracy +/- 1K
- Controls systems with maximum 3 cold heads
- Temperature control of stage 1 or stage 2
- 2 set points definable



#### **Accelerators**

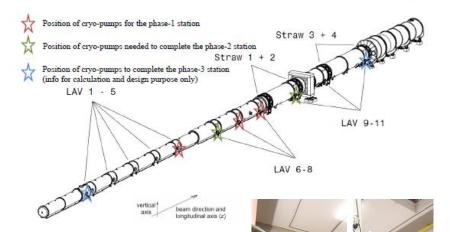
#### CERN - NA62

- Chamber volume 700 m<sup>3</sup>
- Pump time <1E -06 mbar @ 64 h</li>
- 7 sets VELCO 632
- Controller PCA700C
- Fully integrated into system control





**Cryo controller PCA700C** 



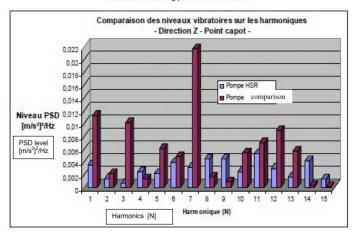


### Low vibration application

- Lowest vibration requirement
- Equipped with modified VELCO and VCP type cryo pumps
- Controlled by HSR controller
- Long operating times
- High gas loads



#### Comparison of vibration levels of the Harmonics Direction Z measuring point cold head hood



#### Chart no.9: Vibration level (Performance-spectral-density) of the 15 first harmonic pairs - direction Z

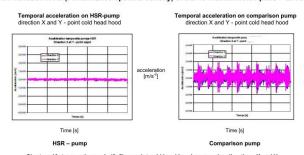


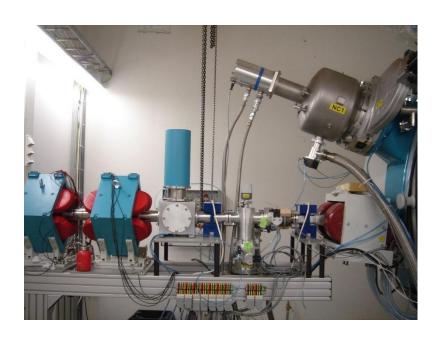
Chart no.10: temporal records (0, 5) s - point cold head hood - crosswise directions X and Y



# **Medical application**



Research for cancer (lab system)



Cyclotron for production of Isotops



# New technologies



**VELCO NT** 



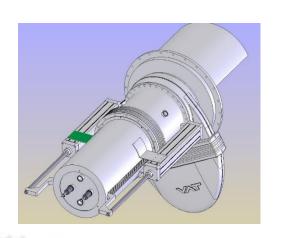
VCP NT

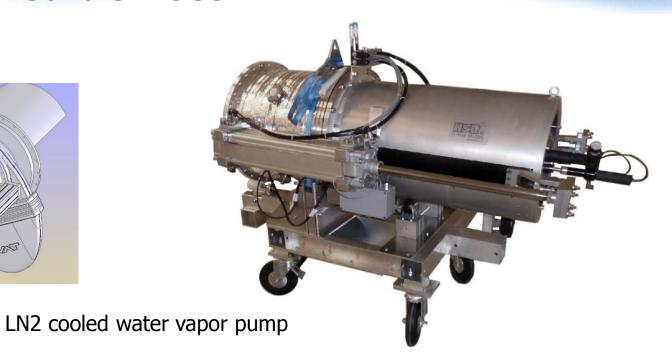


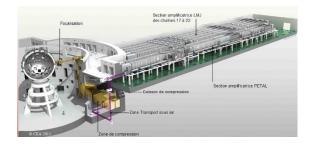
**HSR** Temperature Sensor



## Customized devices



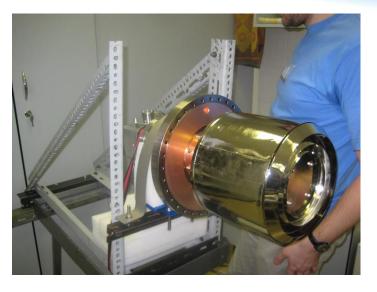






# Special cryogenic devices





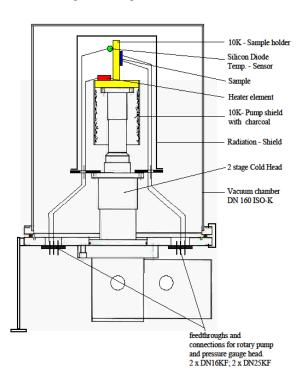
 Bakeable cryo pump (up to 250°C!) for UHV application

End pressure < 10-11 mbar!



# Customized cryostats

#### Low Temperature Sample Test Chamber







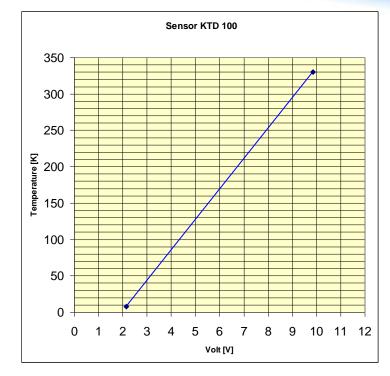




## HSR temperature sensor KTS 100



- Strain expansion technology
- Temperature range 1K 360K
- Linear and accurate measurement
- Resistant to radiation
- **NEW**: Special sensors available for corrosive applications







# HSR cryo controller type HCC and PCA



**HCC100** 



HCC120 / HCC130



**HCC 150** 



**HCC 190** 



Pump set controllers
PCA700C PCA700D PCA700T



# Product range DIF DN 040 - DN 1000



**DN 040** 



DN 063 - 250



**DN 320 - 1000** 



#### **Advantages HSR diffusion pumps**

- Outstanding stability in high pressure range (up to 10-02 mbar)
- Available with cold cap and baffle cap
- Low ultimate pressure
- Suitable for all available pump fluid types
- Long lifetime of heaters
- Low construction height
- Highest quality product (Swiss made)
- Fast delivery times

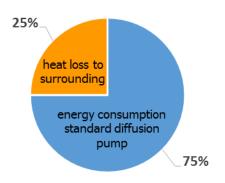




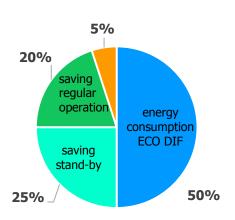
## New Product: ECO DIF







#### ECO DIF

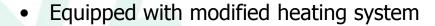


- 20% energy saving during regular operation
- 25% energy saving during stand-by operation (high vacuum valve closed or no gas load present)



# DIF Pumps for high magnetic fields





Operation in high magnetic fields above 1,5 Tesla





#### **HSR Baffles**



HSR multi coolant Baffle (water, refrigerator, LN2, Polycold)



HSR protection baffle for turbo pumps (patented design)



## Protection baffle for turbo pumps

patented



# Special baffle for protection of Turbo Pumps

- optical dense
- optimized conductance
- proven design
- · easy to clean
- very maintenance friendly
- water cooled
- can be used as well as water vapor pump
- · cooling by LN2, Polycold or Refrigerator
- available in various sizes





# Angle valves

#### Eckventil Typ VAP - Angle Valve Type VAP DN 250 - DN 400

· Beidseitig dicht (1 bar) - Both sides tight (1 bar)

· Elektropneumatischer Antrieb - Electro pneumatically activated

· Federbelag gedichtet - Bellows feedthrough

Optische & elektrische Positionsangabe
 Optical and electrical position indication





# HSR Plate valve type HVT ...

#### DN 320 up to DN 1000

patented



- Optimized Design
- Metal Bellow Sealed
- Self Adjusting
- Highest Conductance
- Electro Pneumatically
- Easy To Maintain
- Throttle Position available



#### **Conductance:**

HVT 320 11 000 l/s

HVT 400 16 500 l/s

HVT 500 21 000 l/s

HVT 630 38 000 l/s

HVT 800 50 000 l/s

HVT 1000 78 000 l/s



### UHV - Titanium sublimation pump sets



- Final pressure range E -12 mbar
- High pumping speed for chemically active gases
- 3 filaments (Ti-Mo)



Gas type	H2	N2	02	co	CO2	H2O
Getter layer temperatur	re of					
20 °C l/sec cm <sup>2</sup>	3	5	9	9	8	3
- 195 °C l/sec cm²	9	9	11	11	9	14



#### Service and support

- All ordered articles are normally processed and dispatched within 24 hours
- If P.O. is received before 11:00 a.m., parts will be sent the same day
- A worldwide network of partners and representatives guarantees a
   fast and reliable service and support on customer site.





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