



HSR AG
FL-9496 BALZERS

Established in 2001

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).



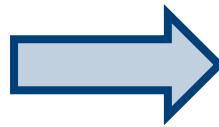


Who we are

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



HSR AG



**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
- Titanium Sublimation pumps and accessories
- High Vacuum Valves
- Complete Pump Sets including pump set controller
- Engineering and manufacturing of customized special devices

Cryogenic products

VCP Cryo Pumps



SINCO Cryo Pumps



VELCO Cryo Pumps



VELCO Sputter Pumps



Cryostats

Customized Devices



Diffusion pumps



DN 040



DN 063 - 250



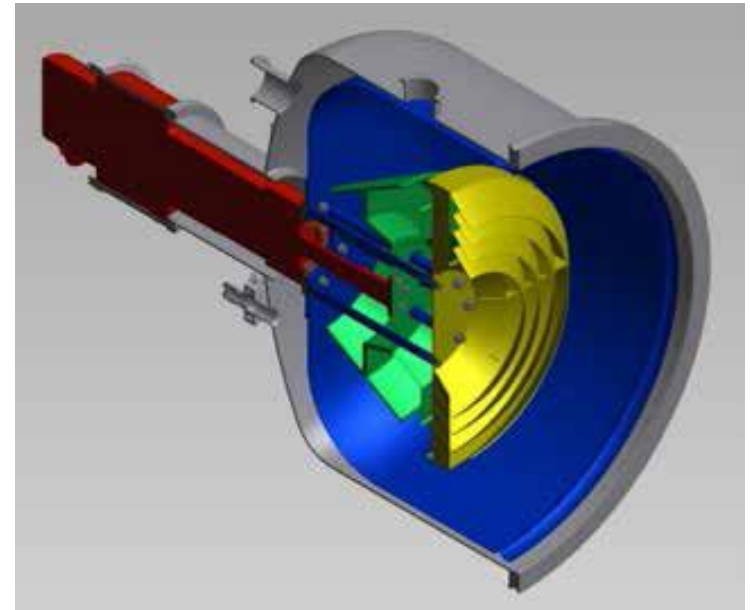
DN 320 - 1000

High vacuum valves



Advantages HSR cryo technology

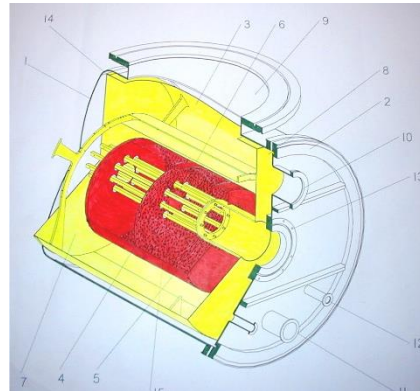
- Low-vibration cooling systems
- Optimized design allows operation at process temperatures up to 380 °C and high gas loads at the same time without especial heat protection
- Powerful cooling permits maximum operating time without regeneration
- Patented geometry provides outstanding uptimes and short 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^{-03} 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



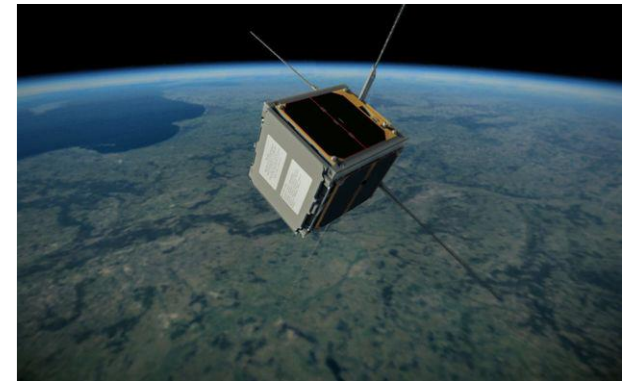
SINCO cryo pumps



- SINCO cryo pumps and devices are designed to have highest pump speed and capacity for certain gases as for example Xenon, hydrogen, Argon or other noble gases
- SINCO cryo pumps or devices can also exclude certain gases from pumping as for example hydrogen
- For that reasons most of SINCO Cryo pumps and devices are customized or process related



Space simulation application



- Satellite thruster testing
- Thermal testing
- Experimental testing



HSR VELCO cryo pumps



VELCO 502



VELCO 1250



VELCO 900

HSR LN₂ cooled cryo pumps



VELCO 800 LN2



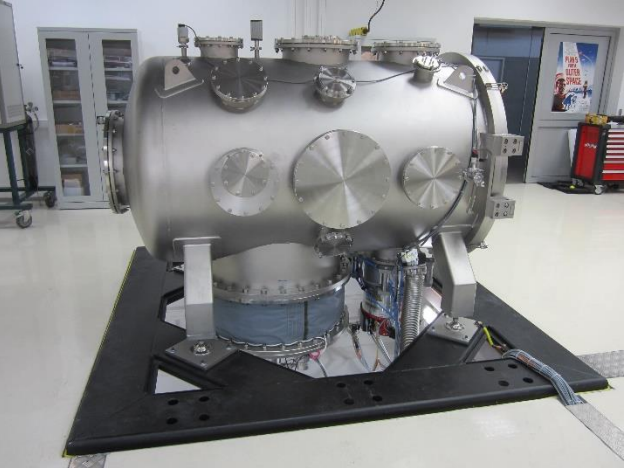
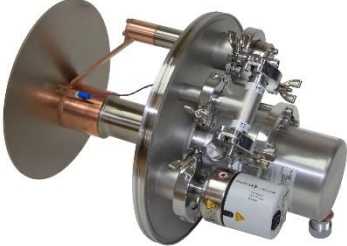
VELCO 1250 LN2



VELCO 900 LN2



Thruster testing



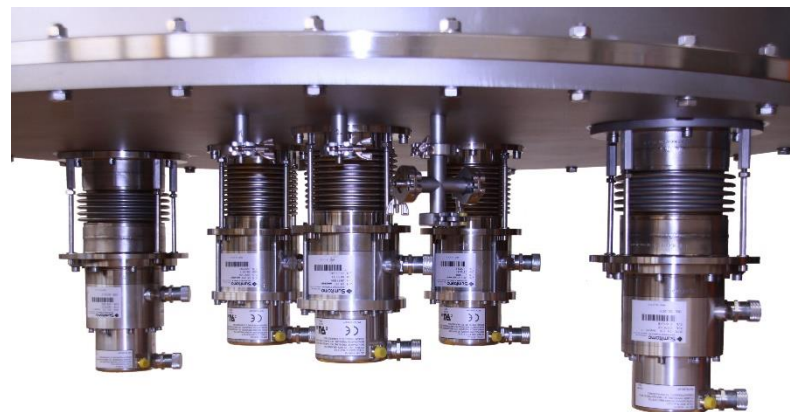
HSR Xenon cryo pumps



VELCO 402 Xe



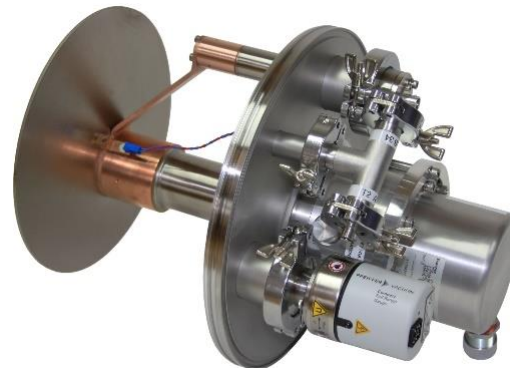
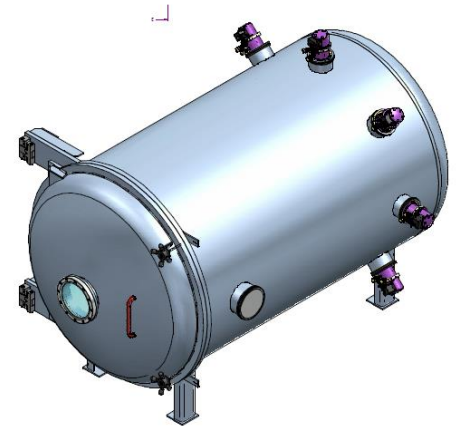
VELCO 632 Xe



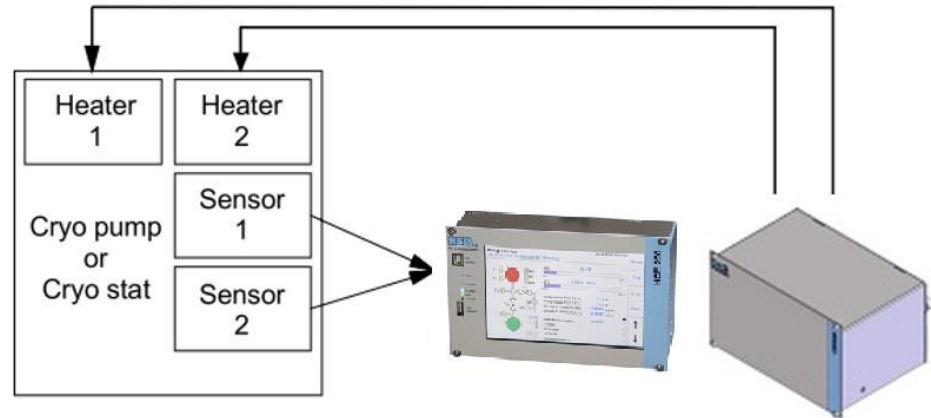
VELCO 1250 Xe

HSR SINCO pumps for Xe pumping

- Pump surface made by Ni-plated high purity copper plate
- Cold plate available in customized sizes
- Equipped with single stage cold head
- Integrated temperature measurement
- Optional heater element for fast regeneration available
- Complete device installed on single DN250 or 320 flange
- Easy installation

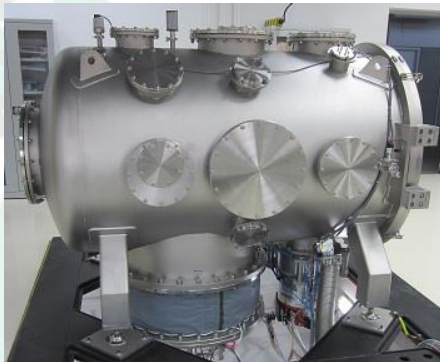


Temperature controlled cryo devices



HSR temp control loop using HCC 200 and CBR 200

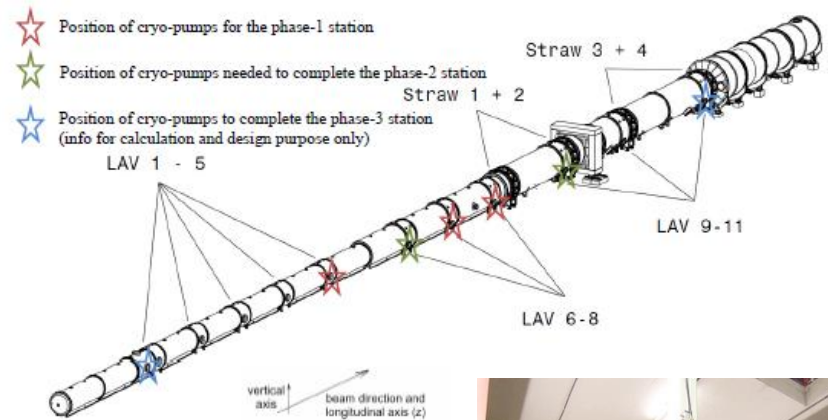
- Can be used for all **VELCO**, **VCP** and **SINCO** cryo pumps
- Control accuracy **+/- 1K**
- Temperature control of **stage 1** or **stage 2** possible
- **2 set points** definable



Accelerators

CERN - NA62

- Chamber volume 700 m³
- Pump time <1E -06 mbar @ 64 h
- 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

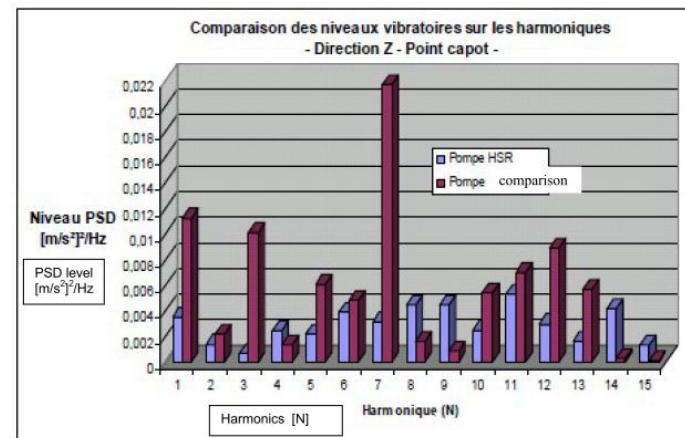
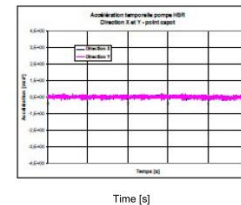


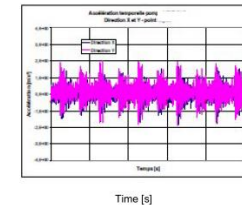
Chart no.9: Vibration level (Performance-spectral-density) of the 15 first harmonic pairs – direction Z

Temporal acceleration on HSR-pump
direction X and Y - point cold head hood



HSR – pump

Temporal acceleration on comparison pump
direction X and Y - point cold head hood



Comparison pump

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

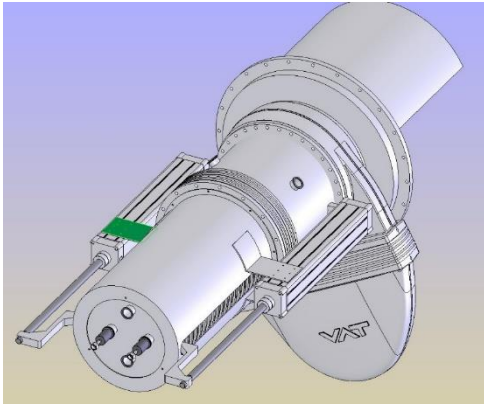


VCP NT

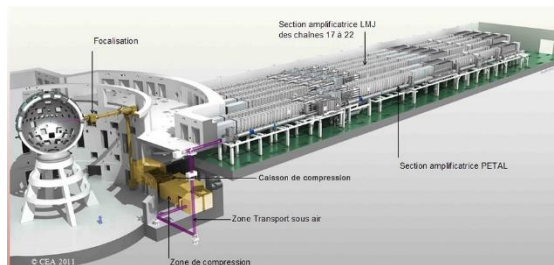


HSR Temperature Sensor

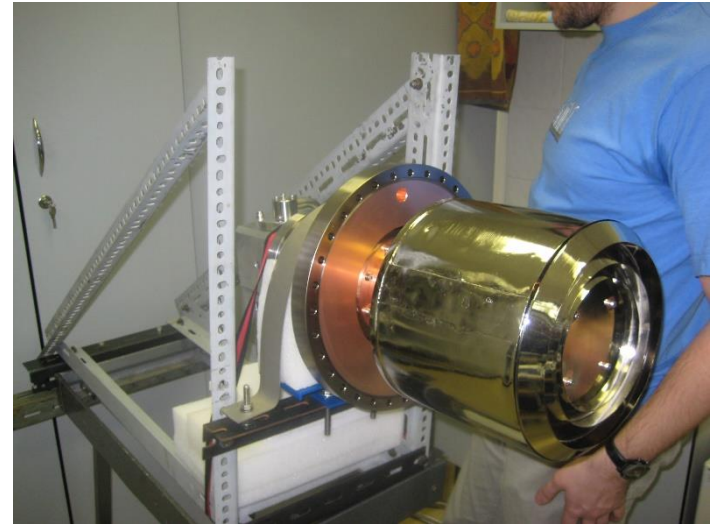
Customized devices



LN2 cooled water vapor pump



Special cryogenic devices

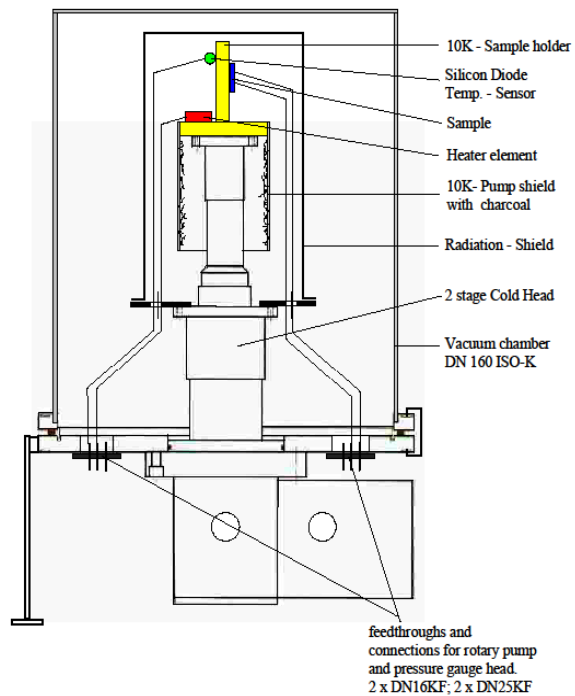


- Bakeable cryo pump (up to 250°C!) for UHV application

End pressure < 10-11 mbar!

Customized cryostats

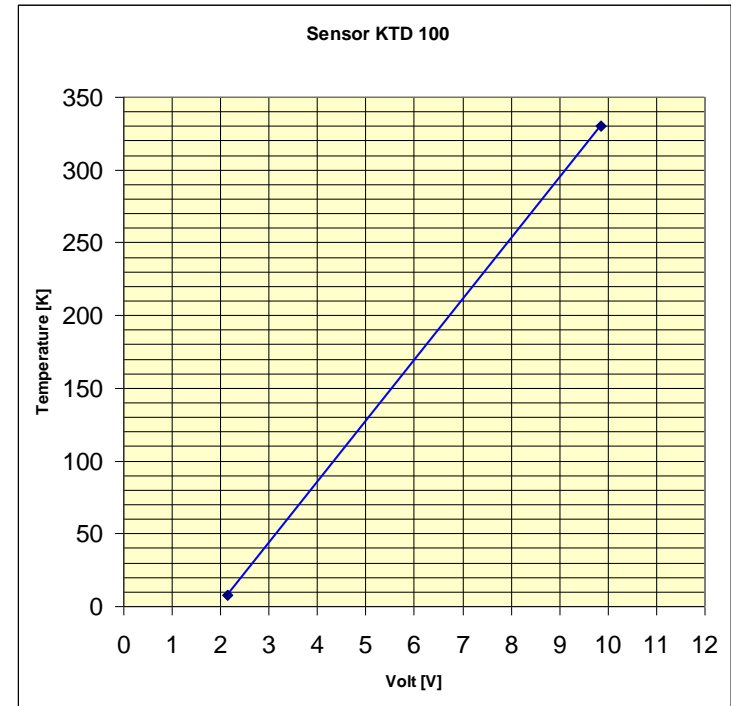
Low Temperature Sample Test Chamber



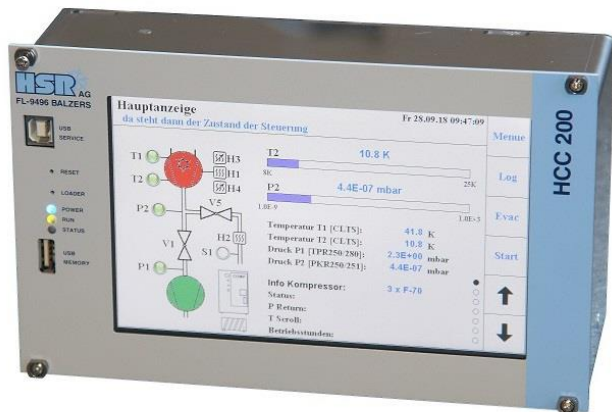
HSR temperature sensor KTS 100



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



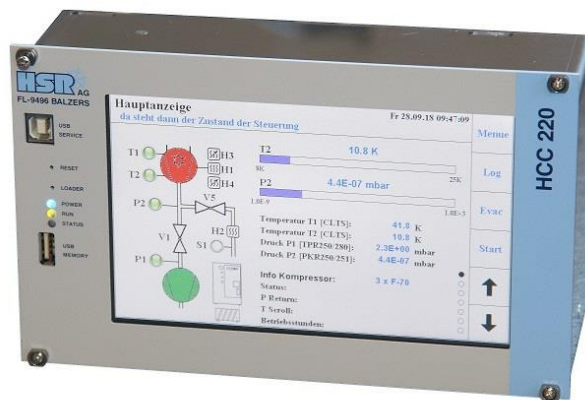
New HSR cryo controller serie HCC 2...



Cryo Controller
HCC 200

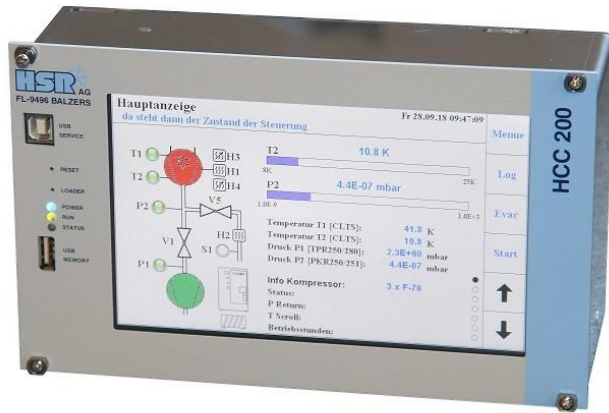


Extended Display
HCE 200



HCC 220

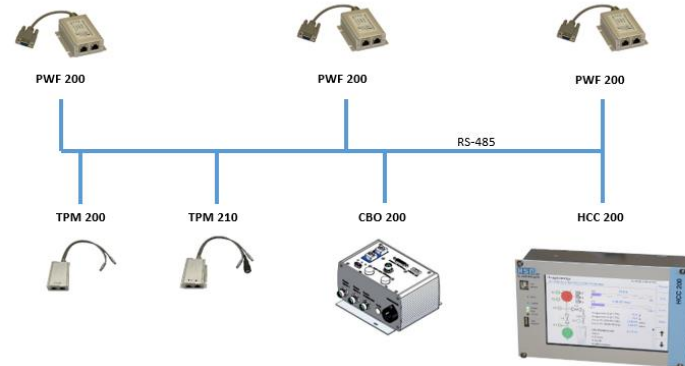
New HSR cryo controller HCC 200



Cryo Controller
HCC 200

The **HCC 200** serves as a basic device. It consists of the actual control device

All system components are connected via **RJ45** cable and controlled by **MODBUS**



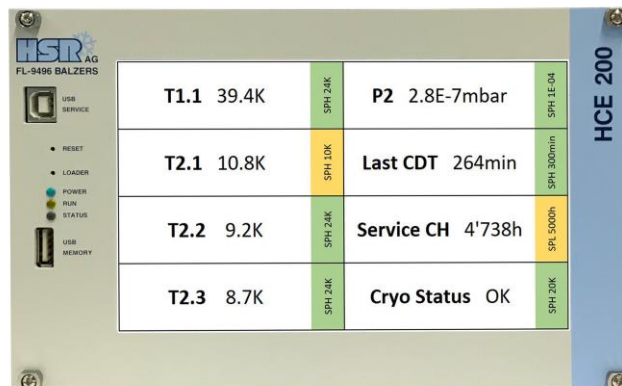
New HSR extended display HCE 200

The **HCE 200**, in conjunction with the **HCC 200** or **HCC220**, is operated as an additional display. It can be used for two different fields of application:

1) It offers freely definable display of measured values and states. For that reason the display can be customized (divided) into 4, 8 or 16 subareas



Extended Display
HCE 200



Product range DIF DN 040 - DN 1000



DN 040



DN 063 - 250



DN 320 - 1000

Advantages HSR diffusion pumps

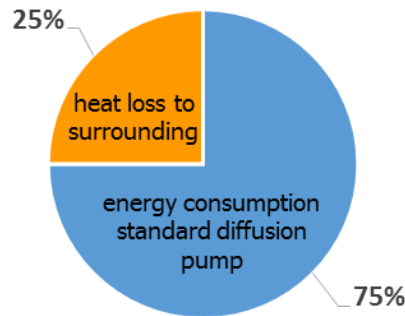
- Outstanding stability in high pressure range (up to 10⁻⁰² mbar)
- Available with cold cap and baffle cap
- Low ultimate pressure
- Suitable for all available pump fluid types
- Long lifetime of heaters
- Low construction height
- Highest quality product (Swiss made)
- Fast delivery times



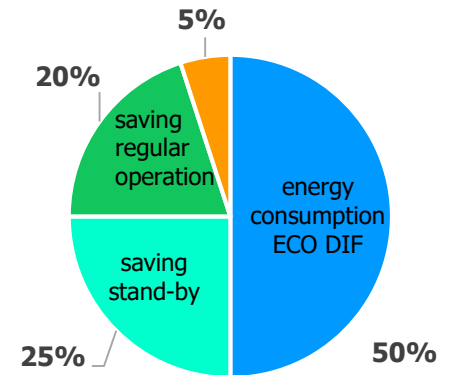
New Product : *ECO DIF*



Standard 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



- Equipped with modified heating system
- 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	O2	CO	CO2	H2O
Getter layer temperature of						
20 °C l/sec cm ²	3	5	9	9	8	3
- 195 °C l/sec cm ²	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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