

HSR VACUUM 2016



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Founded in 2001, HSR AG is a manufacturer of vacuum pumps and components used for a wide range of modern production processes and applications.

Initially the company developed and manufactured a new generation of cryogenic pumps. Responding to current customer requirements, the product portfolio has been expanded to new business segments such as diffusion and UHV-pumps as well as high-vacuum plate-and angle valves.

Thanks to its continuous development, HSR is able to supply today a complete portfolio of cryogenic and diffusion pumps as well as high vacuum valves including accessories. In addition to these components, the company offers engineering capabilities for the development and delivery of customized devices and solutions for special projects in the field of vacuum technology. In close cooperation with the customer, we give highest priority to the efficient implementation of requirements and specifications as well as the development of economic and process-optimized solutions.

Based in Balzers, Liechtenstein, HSR has expanded its existing sales structure in 2009 by establishing a subsidiary, HSR Vacuum GmbH near Frankfurt, Germany. A worldwide network of partners and representatives guarantees fast and reliable service and support on customer site.

*15 Years Success
based on innovation and high quality products*

HSR AG's cryogenic pumps are, amongst other things, known for their impeccable performance data and reliability in use. Long operating periods between necessary maintenance breaks provide for high availability as well as seamless and cost effective operation. Apart from their use in high-vacuum and ultra high-vacuum pumps, HSR's cryogenic pumps are particularly suited for:

- Thin-film coating machinery
- Space simulation chambers
- Sputter equipment
- Fusion test systems
- Particle accelerators
- Thermal coating systems
- Metallization equipment

Product line

VCP Line: Cryogenic pumps – sizes DN100 to DN200

This new, HSR patented pump geometry enables up to a 30% higher volume flow rates and higher capacity, which provides for a longer operating time in comparison to competitors' pumps with the same flange size. Another design feature allows throttling of the volume flow rate of various gases (Ar, O₂, N, CH₄, etc) whilst maintaining the maximum volume flow rate for water vapor.

Velco Line: Cryogenic pumps – sizes DN250 to DN1250

The optimized design permits operation under extreme conditions, i.e. under both high gas load and temperatures above 350° C. The patented pump geometry extends operation times and reduces maintenance downtimes. Powerful cooling allows of long periods of use without the need for maintenance.

- HSR design reduces cool-down times
- Higher cooling power on second stage
- Much better performance on second stage
- Higher capacity on second stage
- Closed circuit operation, no need for continuous gas supply
- Longer operation times between regenerations
- Shorter regeneration cycles
- Longer uptimes between maintenance intervals
- Reduced investment and TCO

Velco Sputter Line: Cryogenic pumps – sizes DN250 to DN400

This type of cryogenic pumps has been developed by HSR particularly to eliminate the so-called memory-effect. Based on a patented technology, a unique pump system has been developed without the use of additional heating elements.

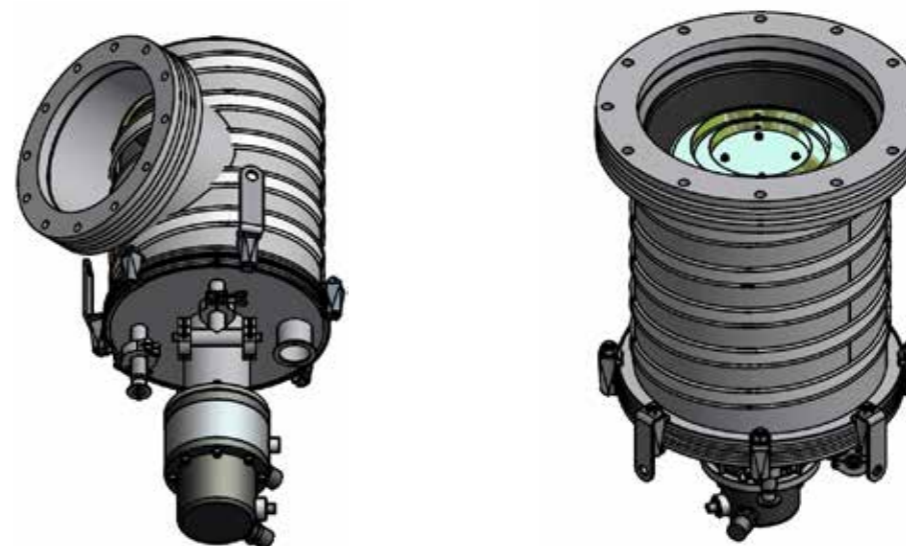
- High cooling performance guarantees the highest level of thermal stability
- No losses in volume flow rate or performance
- The optimized design allows operation with an argon gas pressure of over 1200 sccm
- Non-sensitive to air or gas intrusions
- Pump housing of aluminium or stainless steel
- Available also as flange version (without housing)

Velco Xenon Line: Cryogenic pumps – sizes DN400 to DN1250

Velco Xenon pumps have been developed especially for Xenon gas applications in the field of space simulation. During design and development the main focus was on achieving maximum pump speed together with a high capacity for Xenon gas.

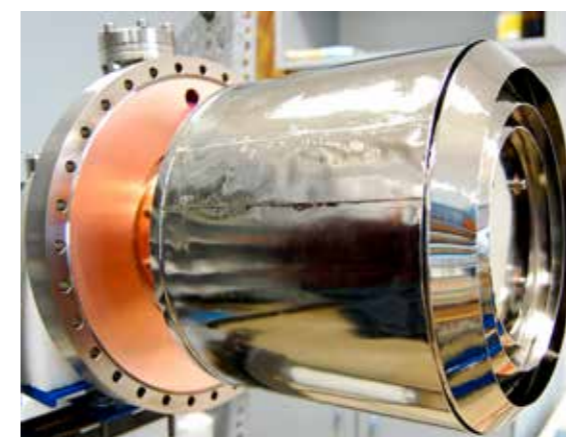
Velco NT Line: Cryogenic pumps – sizes DN400 to DN1250

HSR offers modified cryogenic pumps and devices that can be used in applications with high radiation exposure, such as new technologies, accelerators, medical applications etc. These cryogenic pumps and devices include special materials and panel setups for optimized performance. They can also be modified to allow fast and secure replacement of the devices in the field.



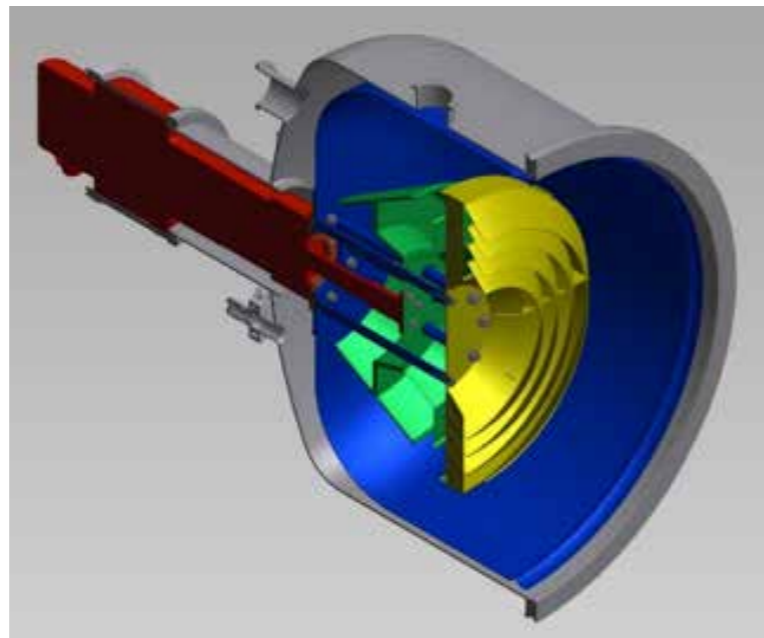
Velco UHV Line: Cryogenic pumps – sizes DN400 to DN1250

All VCP and VELCO type cryopumps can also be fitted with full metallic sealing for XHV applications. A further product modification allows a bake-out of the cryopump system up to 280° C prior to system cool-down. Using such modified cryopump, end pressures of less than 10-11 mbar were achieved.



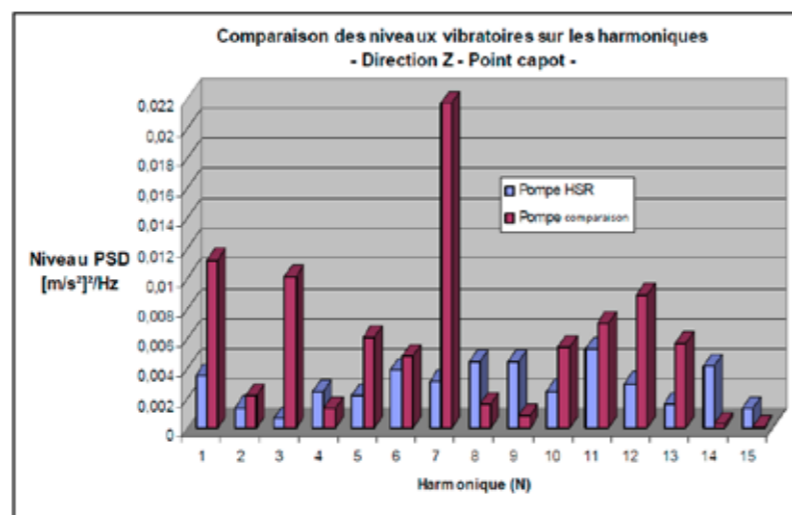
Advantages HSR cryo technology

- Low-vibration cooling systems
- The optimized design allows operation at process temperatures up to 350° C and high gas loads at the same time.
- 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



Vibration levels of cooling system:

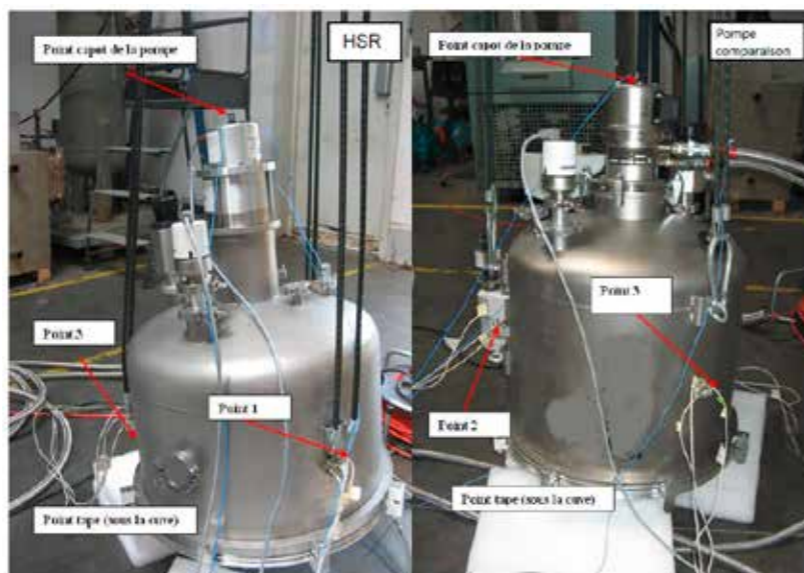
HSR cryogenic pumps are proven to have a lower vibration level than comparable cryogenic pump systems of competitors in the market. A new feature developed by HSR reduces the already low vibration even further. Please contact us for further details.



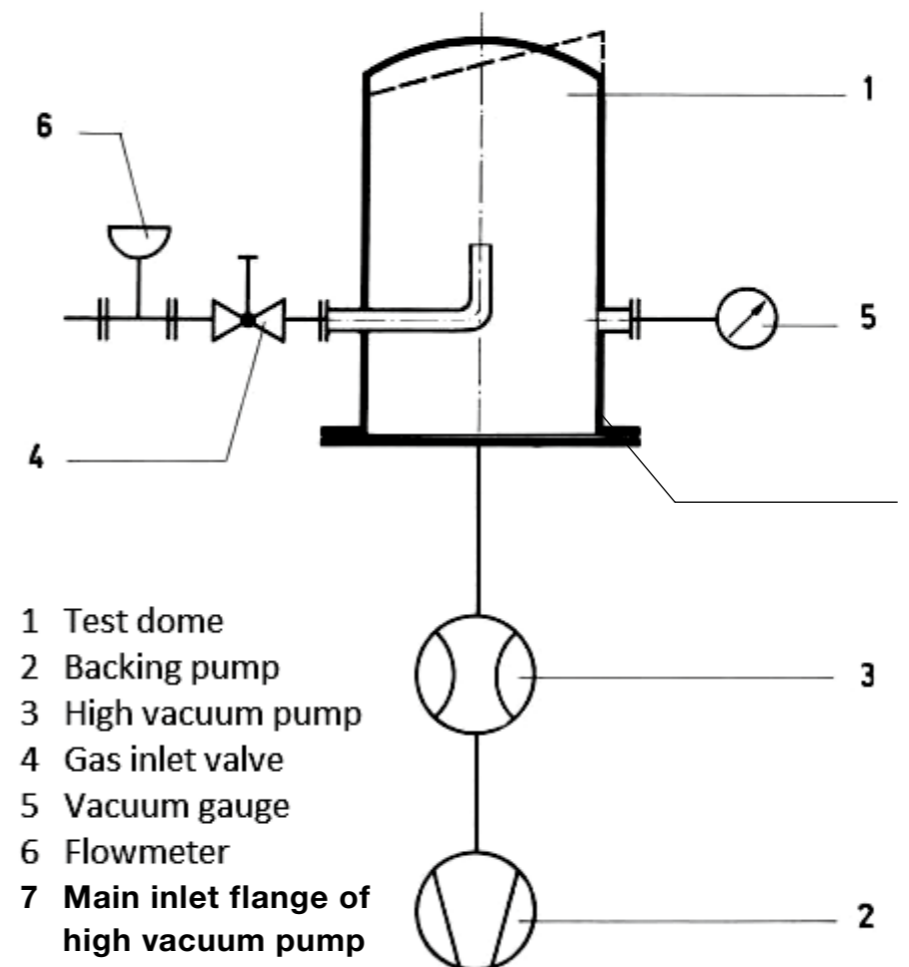
Pump time test result

(official test done by a independent third party):

- Velco 502: 2.1E⁻⁰⁸ mbar
- Comparison pump: 9.5E⁻⁰⁶ mbar



Measurement method for pump speed used at HSR



Important: all shown pumping speed values in this catalogue are related to the inlet flange of corresponding high vacuum pumps!

Resulting high vacuum pumping speed at inlet flange of high vacuum pump is calculated by considering tube conductance between main inlet flange of high vacuum pump (7) and pressure measuring level point at test dome (5).

Cryogenic pumps for standard applications

Technical Data / Model	VCP 100	VCP 160	VCP 200	
Order number	H10000100-T	H10000160-T	H10000200-T	
Inlet flange	DN100 ISO-K	DN160 ISO-K	DN200 ISO-K	
Inlet flange ISO-F/CF	on request	on request	on request	
High vacuum pumping speed at inlet flange	l/sec	values measured according PNEUROP, see page 7 for details		
Water vapour	1 100	2 600	5 000	
Nitrogen	550	1 200	1 800	
Argon	400	1 000	1 550	
Hydrogen	580	1 500	2 500	
Capacity	barl			
Argon/N ₂	100	300	700	
Hydrogen (< 10 ⁻⁵ mbar)	4	10	15	
Crossover	mbarl	50	140	200
Cool down time	min	65	85	105
Warm up time	h			
without purge gas		2.5	3	4
with heated purge gas		<1	<1	<1
Weight	kg	25	28	35

Technical data compressor

Cooling media		water	water	water
Cooling water flow	l/min	3	3	3
Main supply	VAC	230/240-50Hz	230/240-50Hz	230/240-50Hz
Connecting power	kW	2.6-50Hz	2.6-50Hz	2.6-50Hz
Weight	kg	75	75	75

Standard delivery includes

Cryo pump	Cabling compressor cold head
Compressor	Tool kit
Safety valve	Temperature sensor(s): 1 set on stage 2
Flexlines, 3 m long	

Spare Parts

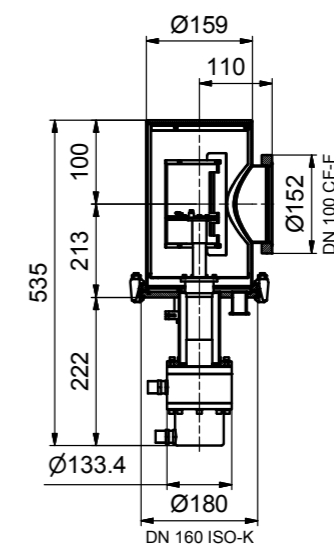
20K panel	H1000400	H008765	H200500
Indium cut for cold head	H1500204	H1500204	H1500204
Temperature sensor 2nd stage	H010310	H010310	H010310
Adsorber compressor	H0100054-T	H0100054-T	H0100054-T
Cold head	H266652	H266652	H266652
Compressor	H266960	H266960	H266960
Flexlines, 3 m	H02003016	H02003016	H02003016

Accessories

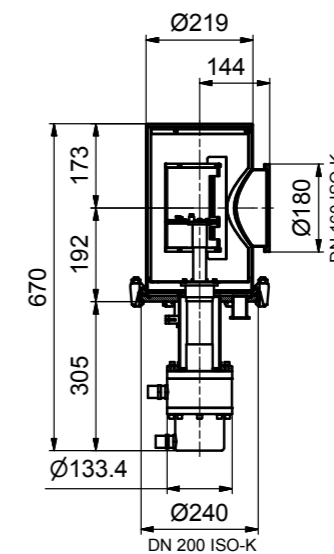
Fast regeneration accessories	HPCR01100	HPCR01160	HPCR01200
Cryo controller HCC120	HPCC01120	HPCC01120	HPCC01120
Tool kit	H101004	H101004	H101004
Maintenance manifold	H1013400	H1013400	H1013400
Flexlines, any length > 150 m	on request	on request	on request

Technical description and further accessories see pages 28 to 42

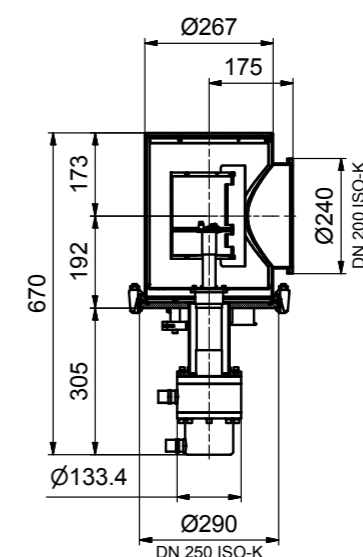
VCP 100



VCP 160



VCP 200



Technical Data / Model		VELCO 252	VELCO 322	VELCO 402
Order number		H100217-T	H100322-T	H10000419-T
Inlet flange		DN250 ISO-K	DN320 ISO-K	DN400 ISO-K
Inlet flange ISO-F/CF		on request	on request	on request
High vacuum pumping speed at inlet flange	l/sec	values measured according PNEUROP, see page 7 for details		
Water vapour		7 700	11 500	18 200
Nitrogen		3 500	5 000	8 000
Argon		2 900	4 200	6 800
Hydrogen		4 500	5 500	7 500
Capacity				
Argon/N ₂		2 500	2 500	8 000
Hydrogen (< 10 ⁻⁵ mbar)		25	25	32
Crossover	mbarl	500	600	600
Cool down time	min	105	105	100
Warm up time	h			
without purge gas		5	5	5
with heated purge gas		< 1.5	< 2	< 2
Weight	kg	30	32	40

Technical data compressor

Cooling media		water	water	water
Cooling water flow	l/min	6-9	6-9	6-9
Main supply	VAC	380 - 415 - 50Hz	380 - 415 - 50Hz	380 - 415 - 50Hz
Connecting power	kW	6.5	6.5	6.5
Weight	kg	100	100	100

Standard delivery includes

Cryo pump	Cabling compressor cold head
Compressor	Tool kit
Safety valve	Temperature sensor(s): 1 set on stage 2 and 1 set on stage 1
Flexlines, 3m long	

Spare Parts

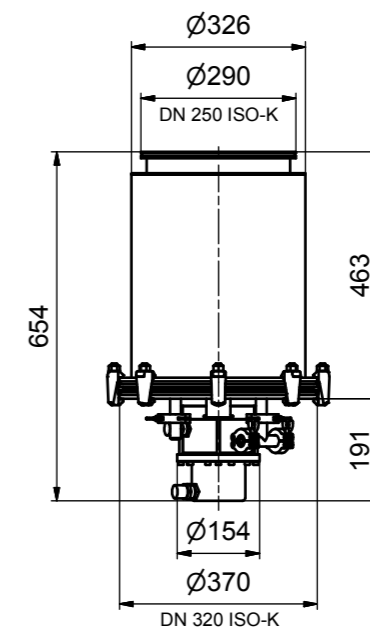
20K panel	H2500142	H2500142	BP265760-X
Indium cut for cold head	H1500210	H1500210	H1500210
Temperature sensor 2nd stage	H010310	H010310	H010310
Temperature sensor 1st stage	H010310-1	H010310-1	H010310-1
Adsorber compressor	H0100052-T	H0100052-T	H0100052-T
Cold head	H14026211	H14026211	H14026211
Compressor	H0451591	H0451591	H0451591
Flexlines, 3 m	H02003016	H02003016	H02003016

Accessories

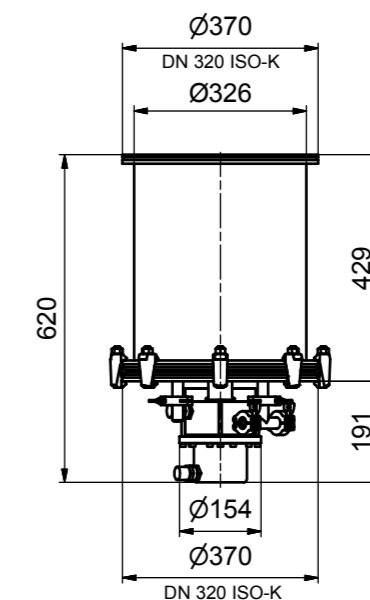
Fast regeneration accessories	HPCR01320	HPCR01320	HPCR01400
Cryo controller HCC120	HPCC01120	HPCC01120	HPCC01120
Tool kit	H101070	H101070	H101070
Maintenance manifold	H1013400	H1013400	H1013400
Flexlines, any length > 150 m	on request	on request	on request

Technical description and further accessories see pages 28 to 42

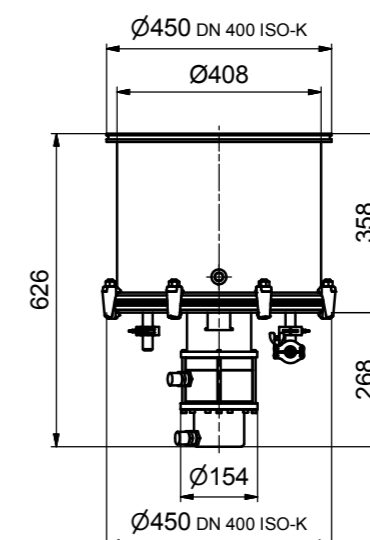
VELCO 252



VELCO 322



VELCO 402



Technical Data / Model	VELCO 502	VELCO 632	VELCO 801
Order number	H10000517-T	H10000617-T	H10000801-T
Inlet flange	DN500 ISO-K	DN630 ISO-K	DN800 ISO-F
Inlet flange ISO-F/CF	on request	on request	
High vacuum pumping speed at inlet flange	l/sec	Values measured according PNEUROP, see page 7 for details	
Water vapour	28 500	48 200	73 000
Nitrogen	12 000	16 500	28 000
Argon	8 500	13 500	24 000
Hydrogen	9 100	10 000	25 000
Capacity	barl		
Argon/N ₂	10 000	15 000	20 000
Hydrogen (< 10 ⁻⁵ mbar)	38	50	100
Crossover	mbarl	750	900
Cool down time	min	105	150
Warm up time	h		
without purge gas	6	6	8
with heated purge gas	<2	<3	<3
Weight	kg	47	85

Technical data compressor

Cooling media		water	water	water
Cooling water flow	l/min	6-9	6-9	6-9
Main supply	VAC	380 - 415 - 50Hz	380 - 415 - 50Hz	380 - 415 - 50Hz
Connecting power	kW	6.5	6.5	6.5
Weight	kg	100	100	2 x 100

Standard delivery includes

Cryo pump		Cabling compressor cold head
Compressor		Tool kit
Safety valve		Temperature sensor(s): 1 set on stage 2 and 1 set on stage 1
Flexlines 3 m; Velco 801 5 m		

Spare Parts

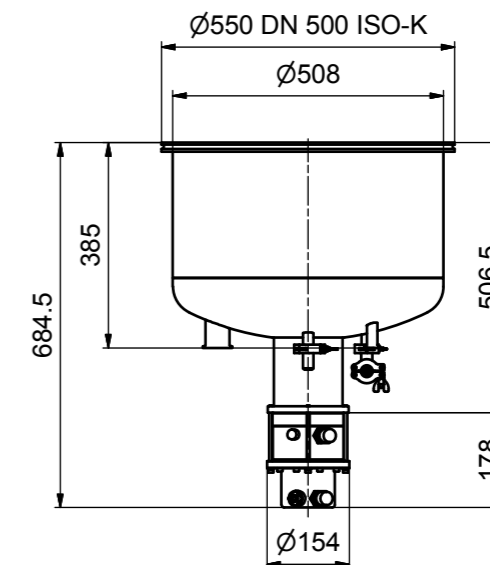
20K panel	BP265760-X	H630014	H8010050
Indium cut for cold head	H1500210	H1500210	H1500210
Temperature sensor 2nd stage	H010310	H010310	H010310
Temperature sensor 1st stage	H010310-1	H010310-1	H010310-1
Adsorber compressor	H0100052-T	H0100052-T	H0100052-T
Cold head	H14026211	H14026211	H14026211
Compressor	H0451591	H0451591	H0451591
Flexlines, 3 m	H02003016	H02003016	H02003016
Flexlines, 5 m	H0205016	H0205016	H0205016

Accessories

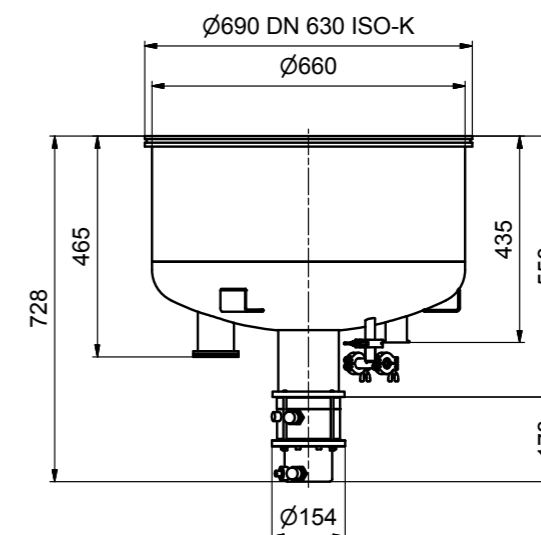
Fast regeneration accessories	HPCR01500	HPCR01630	HPCR01800
Cryo controller HCC120/HCC130	HPCC01120	HPCC01120	HPCC001130
Tool kit	H101070	H101070	H101070
Maintenance manifold	H1013400	H1013400	H1013400
Flexlines, any length > 150 m	on request	on request	on request

Technical description and further accessories see pages 28 to 42

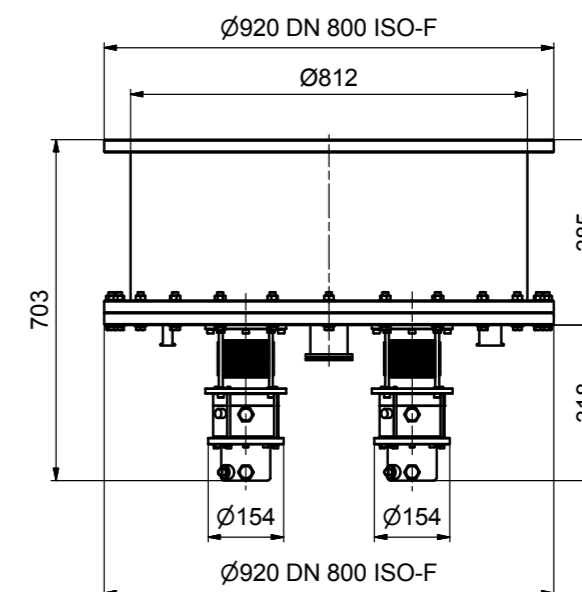
VELCO 502



VELCO 632



VELCO 801



Technical Data / Model	VELCO 900	VELCO 1000	VELCO 1250
Order number	H10000809-T	H10001000-T	H10001250-T
Inlet flange	DN900 ISO-F	DN1000 ISO-F	DN1250 ISO-F
High vacuum pumping speed at inlet flange	l/sec	Values measured according PNEUROP, see page 7 for details	
Water vapour	92 000	114 000	177 000
Nitrogen	36 000	45 000	67 000
Argon	31 000	38 000	57 000
Hydrogen	33 000	40 000	60 000
Capacity	barl		
Argon/N ₂	21 000	22 000	30 000
Hydrogen (< 10 ⁻⁵ mbar)	110	120	150
Crossover	mbarl	1 500	1 500
Cool down time	min	180	180
Warm up time	h		
without purge gas	8	8	8
with heated purge gas	<3	<3	<3
Weight	kg	360	415

Technical data compressor

Cooling media		water	water	water
Cooling water flow	l/min	6-9	6-9	6-9
Main supply	VAC	380 - 415 - 50Hz	380 - 415 - 50Hz	380 - 415 - 50Hz
Connecting power	kW	2 x 6.5	3 x 6.5	3 x 6.5
Weight	kg	2 x 100	3 x 100	3 x 100

Standard delivery includes

Cryo pump	Cabling compressor cold head
Compressor	Tool kit
Safety valve	Temperature sensor(s): 2 sets on stage 2 and 1 set on stage 1
Flexlines 6 m	

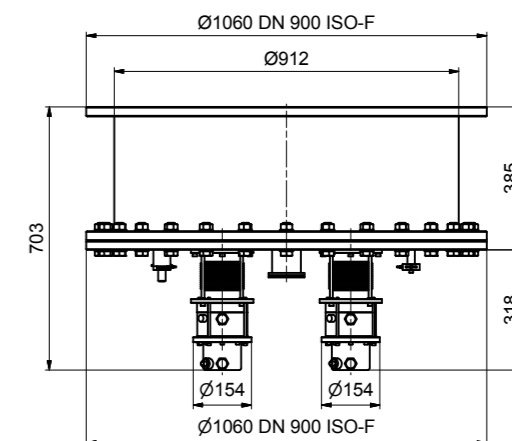
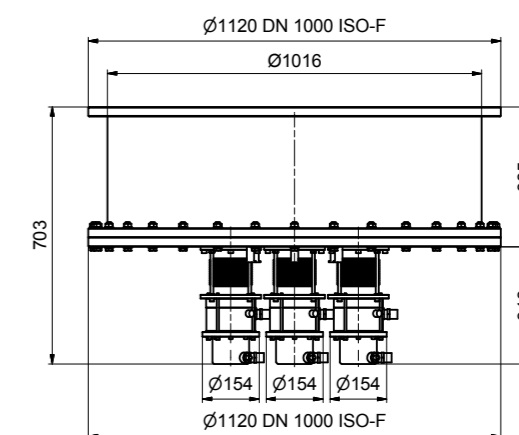
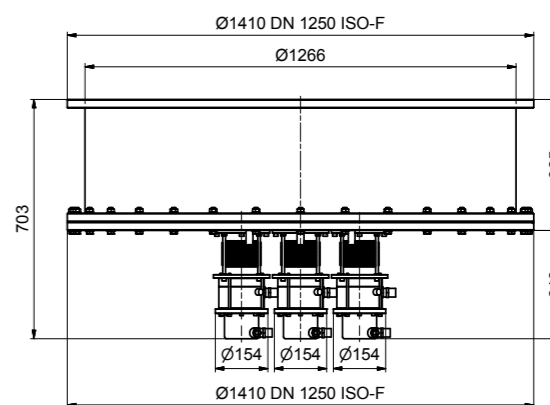
Spare Parts

20K panel	H8010050-X	H100050	H12503845
Indium cut for cold head	H1500210	H1500210	H1500210
Temperature sensor 2nd stage	H010310	H010310	H010310
Temperature sensor 1st stage	H010310-1	H010310-1	H010310-1
Adsorber compressor	H0100052-T	H0100052-T	H0100052-T
Cold head	H14026211	H14026211	H14026211
Compressor	H0451591	H0451591	H0451591
Flexlines, 6 m	H02006016	H02006016	H02006016

Accessories

Fast regeneration accessories	HPCR01901	HPCR01000	HPCR01250
Cryo controller HCC130	HPCC001130	HPCC001130	HPCC001130
Tool kit	H101070	H101070	H101070
Maintenance manifold	H1013400	H1013400	H1013400
Flexlines, any length > 150 m	on request	on request	on request

Technical description and further accessories see pages 28 to 42

VELCO 900**VELCO 1000****VELCO 1250**

Cryogenic pumps for sputter applications

Technical Data / Model		VELCO 252S	VELCO 322S	VELCO 402S
Order number		H100218-T	H100323-T	H100418-T
Inlet flange		DN250 ISO-K	DN320 ISO-K	DN400 ISO-K
Inlet flange ISO-F/CF		on request	on request	on request
High vacuum pumping speed at inlet flange	l/sec	Values measured according PNEUROP, see page 7 for details		
Water vapour		7 700	11 500	18 200
Nitrogen		3 000	3 500	6 500
Argon		2 500	3 000	5 200
Hydrogen		3 800	5 700	7 500
Max. gas flow (Ar)	sccm			
Continuous operation		1 000	1 000	1 000
Short term		1 250	1 250	1 250
Capacity	barl			
Argon/N ₂		2 500	2 500	8 000
Hydrogen (< 10 ⁻⁵ mbar)		25	25	30
Crossover	mbarl	500	500	600
Cool down time	min	100	100	120
Warm up time	h			
without purge gas		5	5	5
with heated purge gas		<2	<2	<2
Weight	kg	32	34	40
Technical data compressor				
Cooling media		water	water	water
Cooling water flow	l/min	6-9	6-9	6-9
Main supply	VAC	380 - 415 - 50Hz	380 - 415 - 50Hz	380 - 415 - 50Hz
Connecting power	kW	6.5	6.5	6.5
Weight	kg	100	100	100

Standard delivery includes

Cryo pump	Cabling compressor cold head
Compressor	Tool kit
Safety valve	Temperature sensor(s): 1 set on stage 2 and 1 set on stage 1
Flexlines 3 m	

Spare Parts

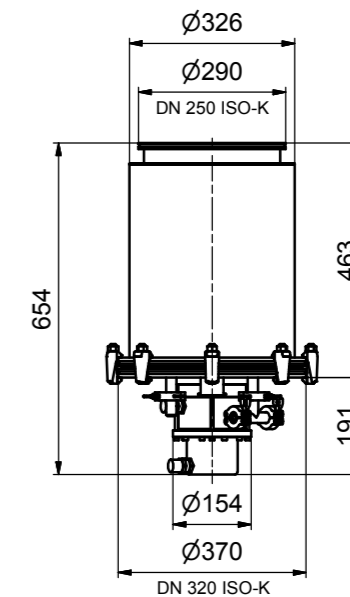
20K panel	H2500142	H2500142	BP265760-X
Indium cut for cold head	H1500210	H1500210	H1500210
Temperature sensor 2nd stage	H010310	H010310	H010310
Temperature sensor 1st stage	H010310-1	H010310-1	H010310-1
Adsorber compressor	H0100052-T	H0100052-T	H0100052-T
Cold head	H14026211	H14026211	H14026211
Compressor	H0451591	H0451591	H0451591
Flexlines, 3 m	H02003016	H02003016	H02003016

Accessories

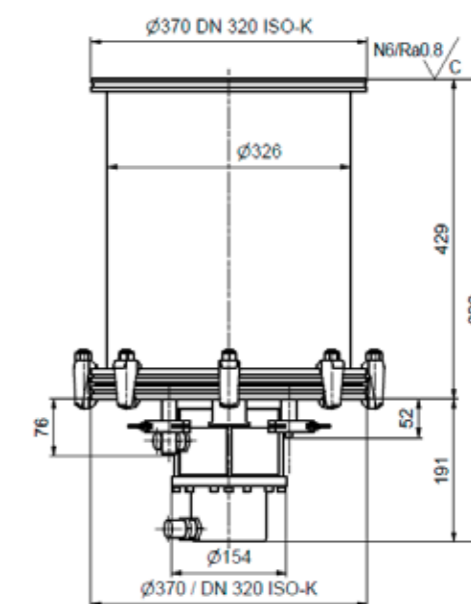
Fast regeneration accessories	HPCR01320	HPCR01320	HPCR01400
Cryo controller HCC120	HPCC01120	HPCC01120	HPCC01120
Tool kit	H101070	H101070	H101070
Maintenance manifold	H1013400	H1013400	H1013400
Flexlines, any length > 150 m	on request	on request	on request

Technical description and further accessories see pages 28 to 42

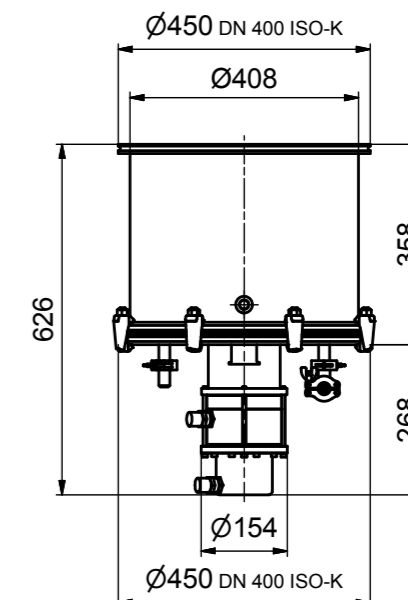
VELCO 252S



VELCO 322S



VELCO 402S



Cryogenic pumps for Xenon application

Technical Data / Model	VELCO 402 Xe	VELCO 502 Xe	VELCO 632 Xe	
Order number	H10000418-T	H10000518-T	H10000619-T	
Inlet flange	DN400 ISO-K	DN500 ISO-K	DN630 ISO-K	
Inlet flanges ISO-F/CF	on request	on request	on request	
High vacuum pumping speed at inlet flange	l/sec	Values measured according PNEUROP, see page 7 for details		
Water vapour	18 200	28 500	48 200	
Nitrogen	6 800	10 500	18 500	
Argon	5 800	7 300	15 500	
Hydrogen	6 400	7 800	14 000	
Xenon	6 700	10 500	18 000	
Capacity	barl			
Argon/N ₂	8 000	10 000	15 000	
Xenon/Xe	7 500	9 300	14 000	
Hydrogen (< 10 ⁻⁵ mbar)	32	38	50	
Crossover	mbarl	600	750	900
Cool down time	min	120	120	240
Warm up time	h			
without purge gas	6	6	8	
with heated purge gas	<2	<2	<3	
Weight	kg	42	55	220
Technical data compressor				
Cooling media	water	water	water	
Cooling water flow	l/min	6-9	6-9	6-9
Main supply	VAC	380 - 415 - 50Hz	380 - 415 - 50Hz	380 - 415 - 50Hz
Connecting power	kW	6.5	6.5	2 x 6.5
Weight	kg	100	100	100

Standard delivery includes

Cryo pump	Cabling compressor cold head
Compressor	Tool kit
Safety valve	Temperature sensor(s): 1 set on stage 2 and 1 set on stage 1
Flexlines 3 m	

Spare Parts

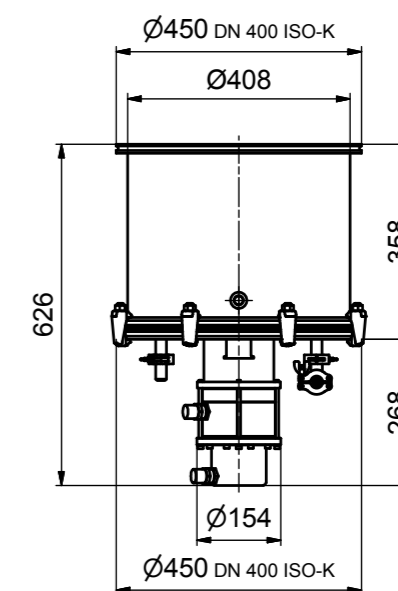
20K panel	BP265760-X	BP265760-X	H630014
Indium cut for cold head	H1500210	H1500210	H1500210
Temperature sensor 2nd stage	H010310	H010310	H010310
Temperature sensor 1st stage	H010310-1	H010310-1	H010310-1
Adsorber compressor	H0100052-T	H0100052-T	H0100052-T
Cold head	H14026211	H14026211	H14026211
Compressor	H0451591	H0451591	H0451591
Flexlines, 3 m	H02003016	H02003016	H02003016

Accessories

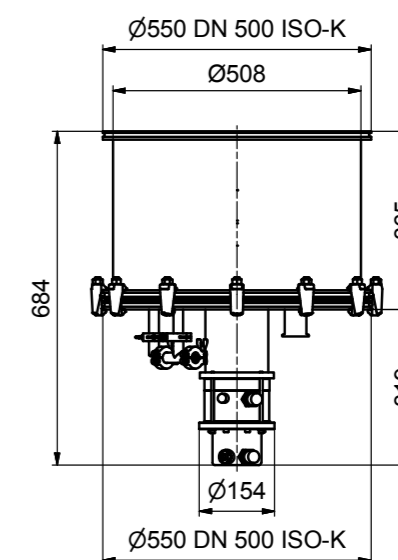
Fast regeneration accessories	HPCR01400	HPCR01500	HPCR01630
Cryo controller HCC120/HCC130	HPCC01120	HPCC01120	HPCC01130
Tool kit	H101070	H101070	H101070
Maintenance manifold	H1013400	H1013400	H1013400
Flexlines, any length > 150 m	on request	on request	on request

Technical description and further accessories see pages 28 to 42

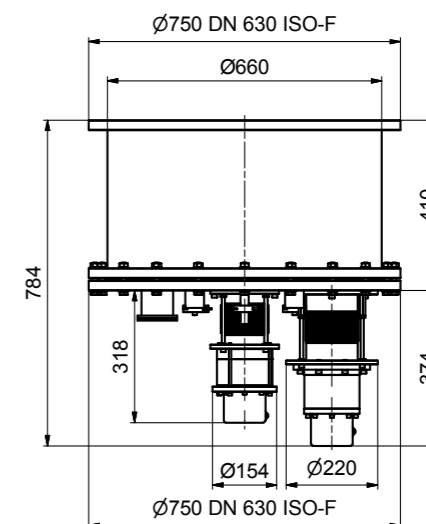
VELCO 402 Xe



VELCO 502 Xe



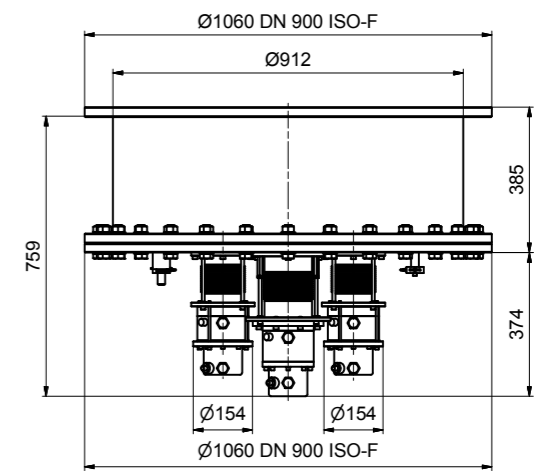
VELCO 632 Xe



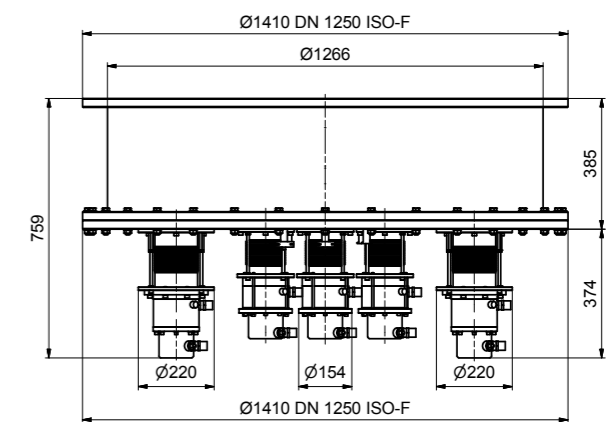
Technical Data / Model	VELCO 900 Xe	VELCO 1250 Xe
Order number	H10000819-T	H10001260-T
Inlet flange	900 ISO-F	DN1250 ISO-F
High vacuum pumping speed at inlet flange	l/sec	values measured according PNEUROP, see page 7 for details
Water vapour	92 000	177 000
Nitrogen	36 000	67 000
Argon	31 000	57 000
Hydrogen	33 000	60 000
Xenon	34 000	65 000
Capacity	barl	
Argon/N ₂	21 000	30 000
Xenon/Xe	20 000	28 000
Hydrogen (< 10 ⁻⁵ mbar)	120	150
Crossover	mbarl	1 500
Cool down time	min	180
Warm up time	h	
without purge gas	8	8
with heated purge gas	<3	<3
Weight	kg	475
		740
Technical data compressors		
Cooling media	water	water
Cooling water flow	l/min	6-9
Main supply	VAC	380 - 415 - 50Hz
Connecting power	kW	3 x 6.5
Weight	kg	3 x 100
		5 x 100
Standard delivery includes		
Cryo pump		Cabling compressor cold head
Compressor		Tool kit
Safety valve		Temperature sensor(s): 1 set on stage 2 and 1 set on stage 1
Flexlines, 6 m		
Spare Parts		
20K panel	H8010060-X	H12503845
Indium cut for cold head	H1500210	H1500210
Temperature sensor 2nd stage	H010310	H010310
Temperature sensor 1st stage	H010310-1	H010310-1
Adsorber compressor	H0100052-T	H0100052-T
Cold head	H14026211	H14026211
Compressor	H0451591	H0451591
Flexlines, 6 m		
Accessories		
Fast regeneration accessories	HPCR01400	HPCR01500
Cryo controller HCC10/HCC150	HPCR01901	HPCR01250
Tool kit	H101070	H101070
Maintenance manifold	H1013400	H1013400
Flexlines, any length > 150 m	on request	on request

Technical description and further accessories see pages 26 to 38

VELCO 900 Xe



VELCO 1250 Xe



Technical Data / Model	VELCO 800 LN ₂	VELCO 900 LN ₂	VELCO 1250 LN ₂	
Order number	H10000800-T	H10000900-T	H10001270-T	
Inlet flange	DN800 ISO-F	900 ISO-F	DN1250 ISO-F	
High vacuum pumping speed at inlet flange	l/sec	Values measured according PNEUROP, see page 7 for details		
Water vapour	73 000	92 000	177 000	
Nitrogen	28 000	36 000	67 000	
Argon	24 000	31 000	57 000	
Hydrogen	25 000	33 000	60 000	
Capacity	barl			
Argon/N ₂	20 000	21 000	30 000	
Hydrogen (< 10 ⁻⁵ mbar)	100	110	150	
Crossover	mbarl	1 500	1 500	1 500
Cool down time	min	<240	<240	>300
Weight	kg	260	380	630

Technical data compressor

Cooling media		water	water	water
Cooling water flow	l/min	6-9	6-9	6-9
Main supply	VAC	380 - 415 - 50Hz	380 - 415 - 50Hz	380 - 415 - 50Hz
Connecting power	kW	6.5	6.5	2 x 6.5
Weight	kg	100	100	2 x 100

Standard delivery includes

Cryo pump	Cabling compressor cold head
Compressor	Tool kit
Safety valve	Temperature sensor(s): 2 sets on stage 2 and 1 set on stage 1
Flexlines 6 m	Connections for LN ₂ supply and return

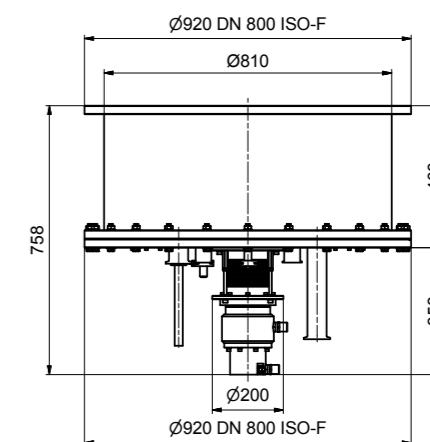
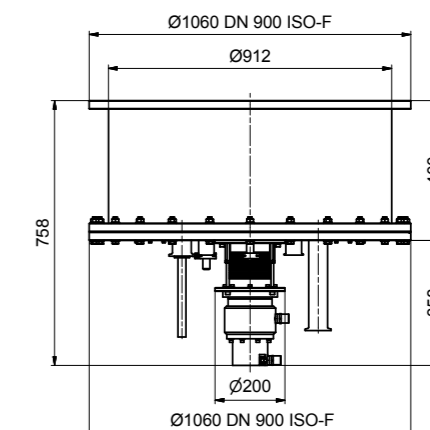
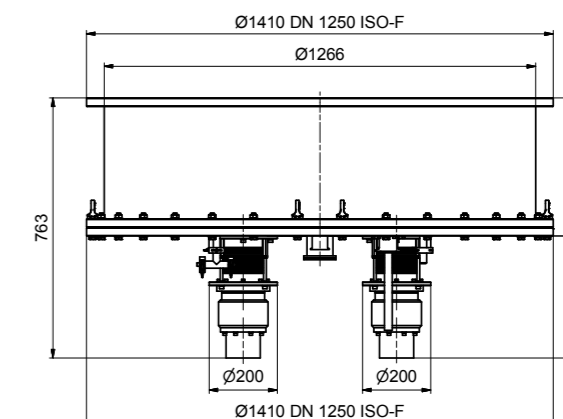
Spare Parts

20K panel	H001516	H8010060-X	H12503845
Indium cut for cold head	H1500112	H1500112	H1500112
Temperature sensor 2nd stage	H010310	H010310	H010310
Temperature sensor 1st stage	H010310-1	H010310-1	H010310-1
Adsorber compressor	H0100052-T	H0100052-T	H0100052-T
Cold head	H266997	H266997	H266997
Compressor	H0451591	H0451591	H0451591
Flexlines, 6 m	H02006016	H02006016	H02006016

Accessories

Fast regeneration accessories	HPCR01800	HPCR01900	HPCR01250
Cryo controller HCC130	HPCC001120	HPCC001120	HPCC001130
Tool kit	H101070	H101070	H101070
Maintenance manifold	H1013400	H1013400	H1013400
Flexlines, any length > 150 m	on request	on request	on request

Technical description and further accessories see pages 26 to 38

VELCO 800 LN₂**VELCO 900 LN₂****VELCO 1250 LN₂**

Cryogenic pumps for new technologies

HSR delivers modified cryogenic pumps and devices for applications with high radiation exposure, such as new technologies, accelerators, medical applications etc.

These pumps and devices include special materials and panel setups for high pump speed of hydrogen.

They are also specially modified for fast and secure exchange of the devices in the field.

- Housings made of aluminium
- Flanges modified for fast and secure exchange
- Internal materials resistant to radiation
- Panels modified for highest performance and capacity for hydrogen and other application-related gases
- HSR temperature sensor KTS100 resistant to radiation

Various sizes and configurations are available on request.



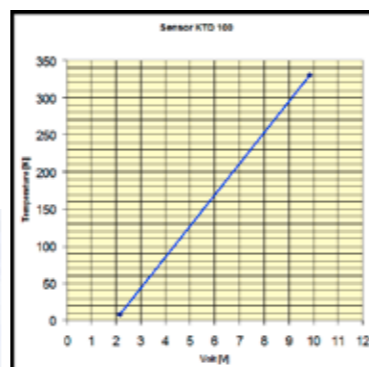
Applications:



Please contact us for further information regarding our HAR cryo pumps

Radiation resistible HSR temperature sensor KTS100

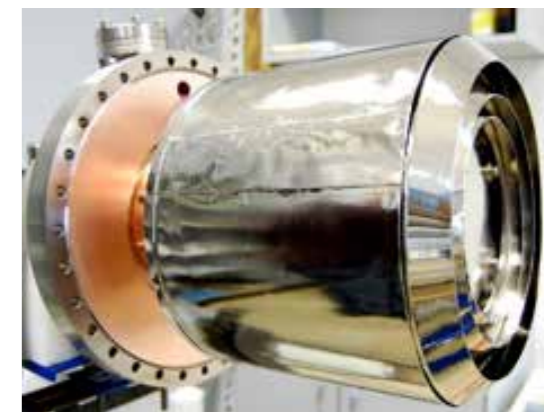
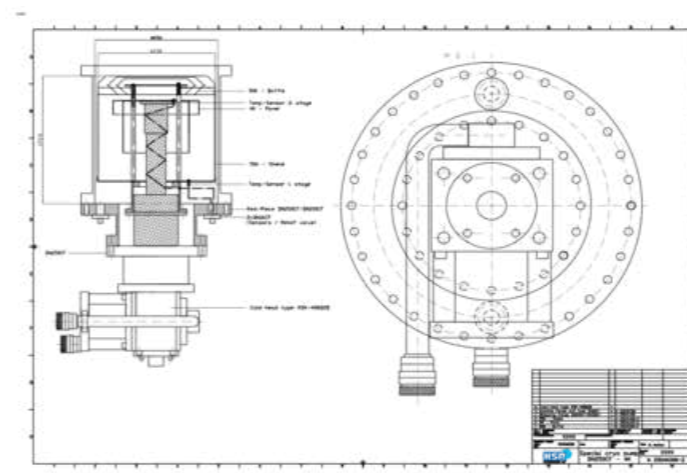
- Linear and reproducible measuring range 2K to 350K
- Sensor also available without holder or mounted on customized holder
- available as stand alone unit including measuring device



For technical description and accessories see page 28 and 29

Customized cryogenic pumps

Bakeable cryopump (up to 280° C) for ultra high-vacuum application

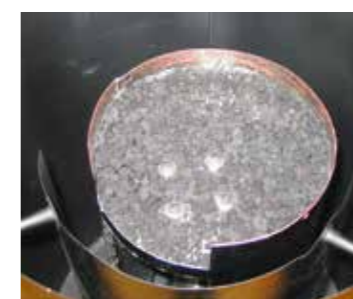


End pressure <math> < 10^{-11}</math> mbar



Customer-tailored cryogenic pumps and devices

Cryogenic pumps optimized for highest pump speed and capacity for specific gases or applications.



Customized cryostats

Cryostats for R&D



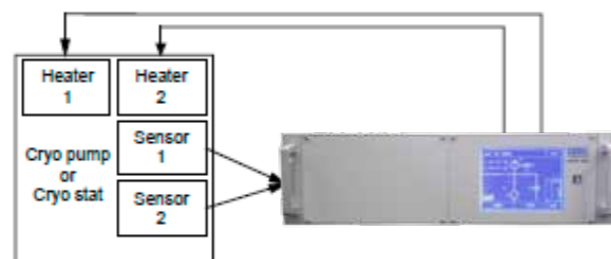
Cryostats for space simulation

Controllable temperature range: 10 to 150 Kelvin
Resolution: ± 1 Kelvin



HSR temperature controller HCC 190

HCC190 controller allows an operation and temperature control of HSR cryopumps or cryostats.



For description and technical details please see page 39

Helium compressors

Standard compressors

Our cryogenic pump systems are equipped with helium compressors from APD/SHI SUMITOMO. These compressors are designed to deliver high-pressure, oil-free helium gas to cryogenic refrigerators. Self-sealing gas couplings allow easy connection of all required components such as cold head, compressor and flexlines. Compressors are available with water cooling or air cooling.

For bigger sized systems, such as our VELCO cryopumps, the type F-70 compressor is used. These water-cooled, high-power compressors achieve an uptime of up to 30,000 hours between maintenance intervals. For convenient and easy operation, all display devices, connectors and switches are located on the front panel. A LCD display shows all important data and additional diagnostic information. Fully automatic remote operation of the compressor is also possible by using the HSR cryo controller type HCC... or pump set controller type PCA...

For our smaller sized VCP cryopump line and small sized cryostats, compressor type HC4E-1 is in use. This compressor also has the display, connectors and switches mounted on its front plate. Uptime between maintenance intervals is also up to 30,000 operating hours. HC4E-1 compressors can also be operated with controllers of type HCC... or type PCA...



Order Information	Order number
Compressor F-70 incl accessories	H0451591
Compressor HC-4E incl accessories	H266960

Standard delivery includes
Compressor
Electrical connectors
Water connectors

Spare Parts	
Adsorber compressor F-70	H0100052-T
Fuse set compressor F-70	H267127
Adsorber compressor HC4-E	H0100054-T

Modified BALZERS compressors

HSR also services, repairs and modifies compressors of the former BALZERS company. During revision, these compressors will be equipped with a new powerful compressor module. After revision, which includes also some other modifications, those compressors provide approx. 25% more cooling power and performance.

HSR also services and repairs compressors of other types and makes. Please contact us for further information.



HSR cryo temperature measuring devices

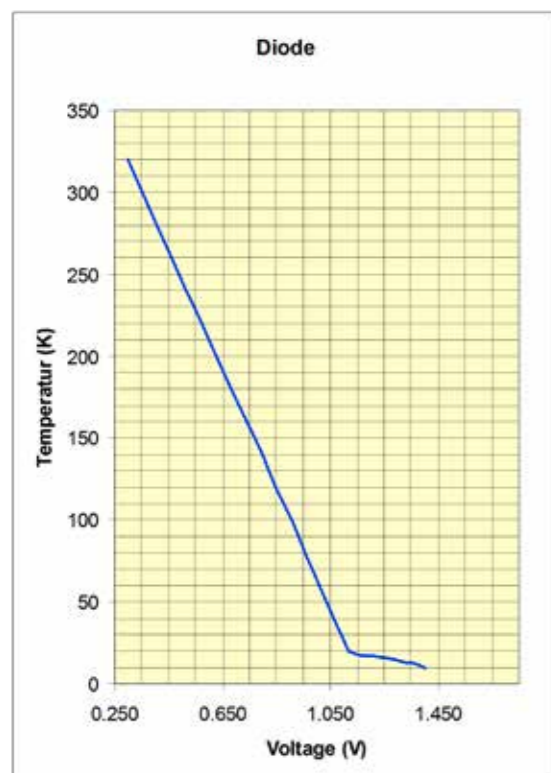
HSR cryo temperature sensor KTS100

Order number H010310

- Sensor technology based on strain expansion
- Linear measuring range from 2 K up to 350 K
- Sensor is resistant to radiation
- Sensor is also available without copper holder shown
- Sensor holder can be modified according to customer's needs and application

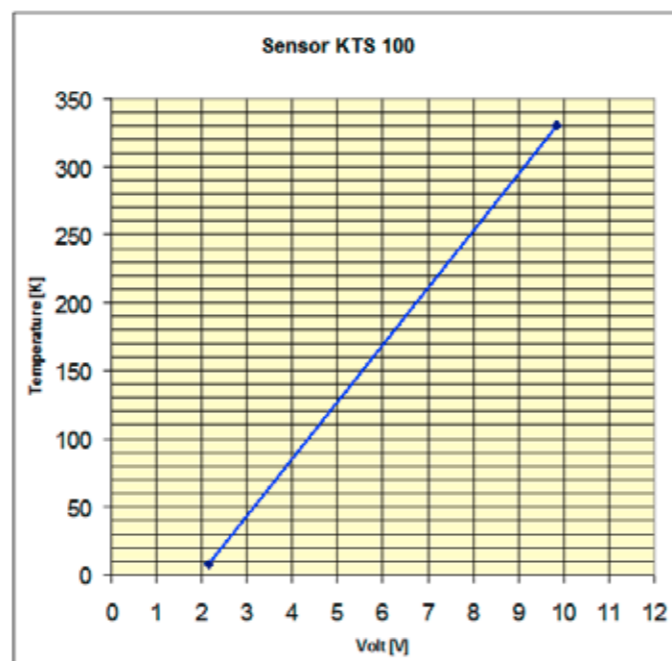


Measuring range of standard silicone diode:



- Non-linear measurement from 4K to 20K
- Silicone diode is not resistant to radiation

Measuring range KTS100:



- **Linear measurement from 2 K up to 350 K!**
- **HSR sensor is resistant to radiation!**

Cryo temperature measuring system KTC100

Order number H106100

- Adapted to HSR sensor KTS100
- Linear measuring range 4-325 K
- Accuracy and resolution 0.1% ± 1 digit, 15 bit
- Digital LED display
- 4 switchable outputs with adjustable thresholds
- Analog Output 4-20 mA or 0-10 VDC
- Mains voltage 230 VAC, 50 Hz



Order Information Components

Order number

3 1/2 LED Monitor **KTM 100**

H106080

Cryo Temperature Sensor (4cables) **KTS 100**

H010310

Connection cable with feedthrough to the Sensor

H214111

Connection cable feedthrough to display unit, 10 m

H6020703-T

Digital interface for IFR100 / IFR102

- Adapted to HSR sensor KTS100
- Linear measuring range 4-325 K
- 4-wire measurement
- 1 or 2 channel device available
- Analog Output 4-20 mA or 0-10 VDC
- Galvanic isolated channels and power inputs
- Main supply voltage 24-250 VAC/VDC



Order Information

Order number

Measuring Transducer IFR100 1x Sensor

H111420

Measuring Transducer IFR102 2x Sensors

H111422

Connection cable feedthrough to interface, 10 m

H6020703-T

Fast regeneration accessories

Heated purge gas inlet

- Purge gas pressure max 3 bar
- Gas consumption (depends on size of pump) 1 to 3 m³
- Purge gas heating temperature appr. 60° C
- 3/8"purge gas inlet connection
- Recommended purge gas N₂ or Ar
- DN16KF purge gas connection on cryopump
- Valve supply voltage 24 V DC or 220 V AC
- Heater supply voltage 220 V AC
- Heater power 100 W



Order Information

Complete set heated gas inlet incl feedthrough adapter for DN 16KF:

24VDC-Ventil and heater 230VAC

H1200114-T

24VAC-Ventil and heater 230VAC

H1200113-T

Spare Parts

Purge gas valve 24VAC 50/60 Hz -NC

H12001124

Purge gas valve 24VDC-NC

H12000014

Purge gas valve 230VAC-NC

H12000015

Heater 230VAC

H12000220

Heater 115VAC

H12000115

Purge gas inlet valve

- Purge gas pressure max 3 bar
- Gas consumption (depends on size of pump) 1 to 3 m³
- 3/8" purge gas inlet connection
- Recommended purge gas N₂ or Ar
- DN16KF purge gas connection on cryopump
- Valve supply voltage 24 V DC or 220 V AC



Order Information

Purge gas inlet valve 24VDC-NC

Order number

H12000014

Also available as security valve (NO = normally open) for purging function of cryo pumps during uncontrolled warm-ups due to power fails.

Order Information

Purge gas inlet valve 24VDC - NO

Order number

H112213

Heater for pump housing

- Integrated safety thermostat
- Optimized for pump sizes
- Easy installation
- VELCRO type fastener
- Temperature controlled
- Connected by silicone cable



Heater

Available for all sizes of HSR cryo pumps
Please contact us for order information

Heater device HCH 200

This newly developed heating device is used for fast regeneration purposes of HSR cryo pumps.

It can also be used for accurate and reproducible temperature control of 1st and/or 2nd stage of cryo pumps, cryostats and other cryogenic devices in applications as

- space simulation
- gas separation
- low temperature testing

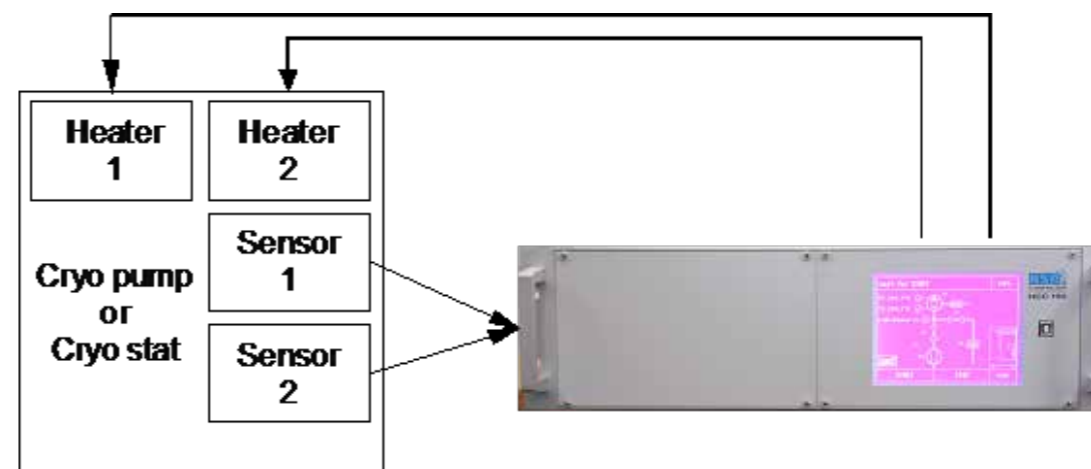
Order Information

HCH200 heater device

Order number

H001110

For operation and control of HCH 200 we recommend HSR cryo and temperature controller HCC 190



See page 39 for more information

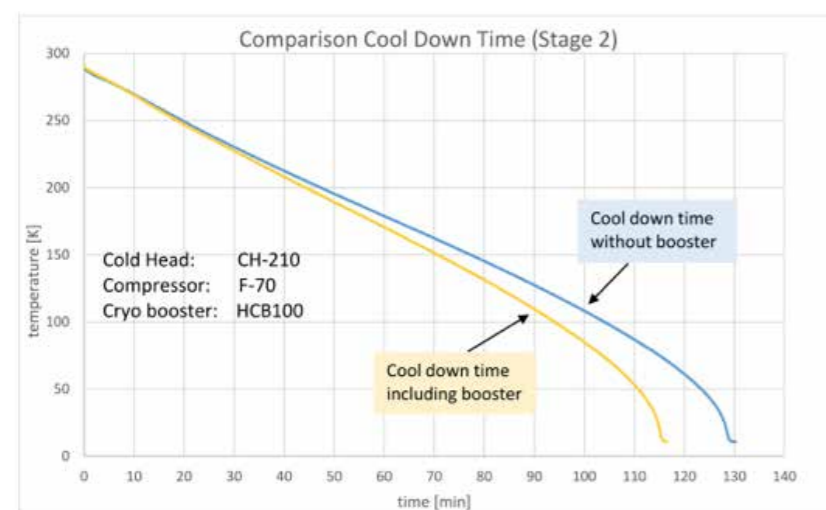
Cryo booster HCB100

This newly developed unit is used for the first and second stages of HSR cryo pump power amplification. It can be used by intermediate pieces in all major HSR cryo systems.

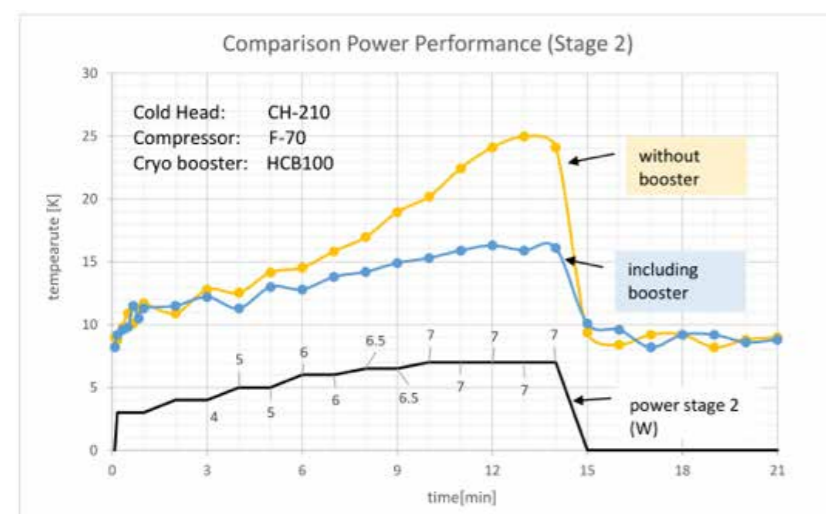


Advantages

—> Shorter cool down times



—> Improved cooling power on second stage



Order Information	Order number
HCB100 cryo booster	H701280

Flexlines

Flexlines

Our flexlines are of highest quality; they are available as «standard high flexibility» and «special extended flexibility» versions. They come in lengths from 1m up to more than 150m and can be further customized.

- Various diameters available: NW10 - NW16 - NW20
- Made of stainless steel
- Single or double braided
- Fully leak tested and filled with helium
- Huge selection of connectors available
- Short delivery times



Order Information	Order number
L=1.5m	H680133
L=3m	H02003016
L=5m	H0205016
L=10m	H10003016
L=15m	H15003016

Hoses

- Connecting hoses from helium bottle to service manifold
- Hoses for refill of compressor
- Customized hoses



Order Information	Order number
Connection hose helium bottle service adapter	H0200006
Hose to exchange Oil on helium compressors (Balzers, CTI and ASC)	H0200005-T
Flexline to refill Helium on compressor, NW12/6, 1.5 m (Balzers Compressor)	H02003006

Maintenance & service tools for cryogenic devices

Maintenance and service manifold

Order number **H1013400**

- Required for service and maintenance of cryogenic systems
- Easy filling, refilling and venting of closed He-circuits



Connectors & features:

- Aeroquip NW16/8 male -2 pcs.
- Aeroquip NW10/4 male
- DN25 KF flange with ball valve for roughing pump
- Connection to the helium gas bottle with manual valve
- He pressure manometer 500 psi
- Safety and overpressure valve

Tool Box

Order number **H101070**

Tool box for servicing compressors of HSR cryopumps

Contents:

- Tools
- Fuses
- Seals



Service Adapters

- Various sizes and types available:
- NW20/12 female to NW16/8 male
- NW20/12 male to NW16/8 female
- Vent adapter NW16/8



Order Information

NW20/12 female to NW16/8 male
NW20/12 male to NW16/8 female
NW16/8 female discharge

Order number

H5452852-T
H5458212-T
H5458213-T

Leak Spray

for simple and quick helium leak detection on:

- Connections
- Flexlines and compressors

Important remark: makes and types are available on request

For export of this product a special «Dangerous goods» packing is required!



Order Information

Leak spray, non export
Leak spray, export by truck
Leak spray, export by sea or air freight

Order number

H1110026
H1110029
H1110028

Spare parts for helium compressors

Adsorbers

Various adsorbers of different makes and types for cryogenic pump systems are available from stock.



Order Information

ASC for 450W/A
ASC for M125W
APD SHI for 1L/R02W
APD SHI for HC-10/F-70
APD SHI for HC-4
Balzers UCC064
CTI Compressors for M8500/M8510/M8200/SC
CTI M9600
Leybold to RW4000/6000
Leybold to AD-RW2/3

Order number

H0100030-T
H0100031-T
H0100051-T
H0100052-T
H010256390
H0100041-T
H0100020-T
H0100021-T
On request
On request

Compressor oil

- Oil for helium compressors
- Available in 1 liter bottles



Spare parts for cold heads

Indium foil

- Thermal conduction Indium foil for cryogenic devices
- Available in various sizes and shapes
- Available also in customized sizes and shapes
- Indium Foil cuts for specific cold head types available on request



Order Information

Indium Foil, 100 x 100 x 0.1mm

Order number

H1501001

Seal sets for cold heads

- Seal sets for various cold heads of different
- makes and types are available on request



Revision and service of cryogenic pump systems

HSR cryogenic pump systems:

In order to guarantee uninterrupted reliability and operation safety of your high-vacuum pump set we recommend you to have a complete inspection of the cryopump after completing an operation cycle of about three years, which can be executed as described below:

Complete in-house inspection at our premises (recommended by HSR)

- Includes the complete check of the cryopump including compressor and flexlines
- System undergoes a performance test and will subsequently be returned to the customer along with a test certificate

Minimum checkup at client site

- Replacement of the in-compressor adsorber
- Replacement of the cold head
- Replacement of the 20K panel including the activated charcoal

HSR also provides:

- Repair, maintenance and service of our own as well as third-party cryopump systems, compressors and accessories.
- Modification of existing cryopump systems for higher capacity and improved cooling power (all makes and types)
- Process specific optimizations and modifications of cryopump systems (all makes and types)



HSR cryo pump controller

HSR cryocontrollers of type HCC are microprocessor-based controllers for cryogenic pump sets. They can be operated as autonomous units or controlled by a primary system control. HCC controllers ensure fully automatic, fail-safe cool-down and regeneration sequences and monitors as well complete operational status.

These systems can be operated locally via touchscreen or remotely via RS232 or USB interfaces using customer's control software or any terminal program. Type HCC controllers allow operating of cryogenic pumps equipped with 1 up to 5 cold heads.

Key Features:

- Touchscreen
- Display of two temperature sensors (stage 1 and stage 2 of the cold head)
- Vacuum measurement gauges of all common makes and types can be used
- Fully automatic cool-down and regeneration sequences
- More than 6 different regeneration sequences selectable and customizable
- Menu guided programmable configuration and parameterization
- Recallable display of all values, such as vacuum pressure, temperatures, switching points and current status
- 2 configurable analog outputs, 0-10 V
- Remote control and monitoring via RS-232 interface
- Remote control and monitoring for peripheral devices as valves, pumps, heaters, etc. also via digital outputs and inputs

System Overview

