

COOLVAC

Refrigerator Cryopumps and Systems



ENGINEERING

In the development and optimization of new applications there is an increasing requirement for custom vacuum system solutions.

Applications

- UHV systems
- Load lock chambers
- Beam tubes of particle accelerators
- General research
- Metallization systems
- Evaporation systems
- Electron beam welding systems
- Space simulation chambers

Most of the known applications are covered by our standard cryopump systems from the iClassicLine and the BasicLine.

However, in the development and optimization of new applications in research or industry (MBE, space simulation) there is an increasing requirement for custom vacuum system solutions.

Jointly with our customers, we design and manufacture custom vacuum solutions to meet customer's specifications.

Engineering Examples

- Large cryopumps up to a pumping speed of 60,000 l/s without liquid nitrogen (LN₂) cooling of the thermal radiation baffle.
Benefit: Increased operational reliability and ease of operation.
- Cryopumps suited for applications involving high thermal loads during degassing of the process chamber to attain pressures in the UHV ranges below 10⁻¹¹ mbar.



Evaporation coating system for a telescope mirror used in astronomy



Our Services

- System design
- Application consulting
- Installation / startup support
- Training (operation and maintenance)

COOLVAC Cryopumps

Leybold fulfils the rapidly increasing requirements for cryopump systems with its “smart” family of cryogenic pumps – adapted to current and future economic trends and cycles.

We have combined a smart controller which is easy to operate for rapid, reliable and clean regeneration with high performance, low vibration and efficient cold heads and compressors.

High quality, high reliability and impressive performance data are guaranteed and confirmed by our customers through current installations.

Single, Double,

iClassicLine Cryopumps

The “iClassicLine” cryopumps have been prepared for fully automatic control and monitoring of their operation and for electric regeneration. In addition to the regeneration heaters and the temperature sensors, they have also been equipped with a vacuum gauge head, a forevacuum valve and control electronics.

- Highly effective pumping speed for all gases, water vapor in particular
- 100% available pumping speed and capacity after each regeneration run
- No nitrogen purge is necessary
- High-performance, low vibration and reliable cold heads integrated
- Insensitive to mechanical disturbances like process particles or external vibrations
- Easy computer process checking and control

COOLVAC iClassicLine with COOL.DRIVE

Cryopump systems with automatic control and regeneration. Proven COOLVAC iClassicLine pumps, equipped with a two-stage COOLPOWER cold head, compressor unit and COOL.DRIVE for fully automatic system control and regeneration.

Measuring data and parameters can be visualized with the optional CRYOVISION.

Installed COOLVAC ClassicLine pumps can be retrofitted with the COOL.DRIVE controller and the CRYOVISION display.

COOLVAC iClassicLine are available for nitrogen pumping speeds from 1500 l/s.

Advantages to the User

- Universally usable for almost all vacuum coating processes
- Ultra-clean vacuum
- High pumping speed
- Efficient regeneration and short regeneration intervals
- Easy operation
- Flexible system design and easy system integration
- Simple and rapid maintenance



with Smart Technology

BasicLine Cryopumps

“BasicLine” cryopumps are equipped only with a temperature sensor (Si diode) at the second stage.

However, the dimensions and the vacuum performance data are identical to the iClassicLine cryopumps.

or Multiple Systems ... up to 30 Cryopumps!

System Components

- Cryopumps
- Compressors
- Flexible helium lines
- Interconnection cables
- COOL.DRIVE controller
- CRYOVISION display

Depending on the the application, single, double and multiple systems with up to 30 cryopumps per CRYOVISION can be built from these components in a modular fashion.



Compressors and Accessories



COOLPAK 2000/2200 compressors

COOLPAK Compressors

The COOLPAK compressor units have been proven to drive cold heads and cryo pumps absolutely reliable and cost-effective.

- COOLPAK 2000/2200 for single operation of COOLVAC pumps up to 3000 l/s

- Remote control via 24 V DC interface
- COOLPAK 6000 H/6200 H for single and multiple operation of up to three cryopumps
- 24 VDC and RS 232 interfaces
- LCD display for displaying the operating status and messages

Advantages

- Easy to install and operate
- Global voltage compatibility
- Minimal maintenance
- Small footprint
- Low cost of ownership



Control / Visualization

COOL.DRIVE Controller

The COOL.DRIVE Controller

- controls and monitors the cryopump via the integrated 24 VDC or RS 232 interface
- provides the power supply voltage for any connected vacuum sensors or vacuum gauges
- controls and drives the cold head motor
- switches the heaters and valves required for operation of the pump
- passes the monitoring signals on to a higher-level system controller
- provides 24 V control signals for switching external vacuum equipment
- provides an analogue signal of the 2nd stage temperature. The Si diode is mounted on the 2nd cold head stage.
- Software update via USB
- optional external Profibus interface

CRYOVISION Display



Optional display unit with 7" touch-screen for COOLVAC iCL cryopumps for visualization of measuring data and parameters in connection with the COOL.DRIVE controller.

Advantages

- Control and monitoring of up to 30 iClassicLine cryopumps
- Integrated data & error logger
- Compact, integrated control directly at the cryopump
- Simple wiring; modern interfaces
- Own intelligence of the pump, e.g.
 - behaviour after a power failure
 - switching the forevacuum valve depending on the application
- Software update via USB
- Simple readout and documentation of process data

COOLVAC

Technical Data

COOLVAC iCL "iClassicLine"		800	1.500	2.000	3.000	5.000	10.000	18.000	30.000	60.000
High vacuum (HV) flange	DN	160 ISO-K	200 ISO-K	250 ISO-K	320 ISO-K	400 ISO-K	500 ISO-K	630 ISO-F	-	1250 ISO-F
		160 CF	200 CF	250 CF	-	-	-	-	-	-
		-	6" ANSI	8" ANSI	10" ANSI	-	20" ANSI	-	35" ANSI	-
Forevacuum flange	DN	25 KF	25 KF	25 KF	25 KF	40 KF	40 KF	63 ISO-K	63 ISO-K	63 ISO-K
Built-in cold head COOLPOWER		7/25	7/25	7/25	7/25	5/100	5/100	5/100(2x) 140T (1x)	5/100(2x) 140T (2x)	5/100(2x)
Cooldown time										
	to T ₂ = 20 K	min	50	60	70	120	100	150	180	-
	to T ₂ = 17 K/130 K	min	-	-	-	-	-	-	260	330
Crossover value	mbar-l	150	210	250	500	700	800	800	1200	1000
Pumping speed										
	H ₂ O	l·s ⁻¹	2,600	4,600	7,000	10,500	18,000	30,000	46,000	93,000
	Ar	l·s ⁻¹	640	1,200	1,600	2,500	4,000	8,400	13,500	25,000
	N ₂	l·s ⁻¹	800	1,500	2,100	3,000	5,200	10,000	18,000	30,000
	H ₂	l·s ⁻¹	1,000	2,500	3,200	6,000	6,200	12,000	14,000	30,000
Capacity										
	Ar/N ₂	bar-l	300	1,000	1,600	2,500	3,000	5,500	6,000	6,500
	H ₂ at 10 ⁻⁶ mbar	bar-l	4.5	15	15	28	32	45	65	100
Maximum volume flow rate										
	Ar/N ₂	mbar-l·s ⁻¹	4	12	12	15	10	10	14	14
	H ₂	mbar-l·s ⁻¹	2	6	6	10	7	7	7	12
Weight										
	iClassicLine models	kg	-	25	32	46	54	70	131	258
	BasicLine models	kg	15	23	25	35	42	50	123	246

All measurements in accordance with PNEUROP+