ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Leybold TURBOVAC 450iX* at our website: ***Click HERE***

Leybold

High Vacuum Pumps

TURBOVAC / TURBOVAC MAG
Turbomolecular Pumps

DIP / DIJ / OB / LEYBOJET
Oil Diffusions Pumps

COOLVAC
Cryo Pumps

COOLPOWER
Cold Heads

COOLPAK
Compressor Units

240.00.02
Excerpt from the Leybold Full Line Catalog 2018
Catalog Part High Vacuum Pumps

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Contents

High Vacuum Pumps

Turbomolecular Pumps **TURBOVAC / TURBOVAC MAG** 6

General

General to TURBOVAC Pumps 6
Applications for TURBOVAC Pumps 12
Accessories for TURBOVAC Pumps 13

Products

Turbomolecular Pumps with Hybrid (magnetic/mechanical) Rotor Suspension

General toTURBOVAC i / iX Pumps. 14
with integrated Frequency Converter 22
with integrated Frequency Converter and integrated Vacuum System Controller 22
Special Turbomolecular Pumps. 34

Turbomolecular Pumps with Magnetic Rotor Suspension
MAG INTEGRA
with integrated Frequency Converter
with and without Compound Stage 36
with separate Frequency Converter
with Compound Stage 50

Accessories

Electronic Frequency Converters
for Turbomolecular Pumps with Magnetic Rotor Suspension. 58
Vibration Absorber 62
Flange Heater for CF High Vacuum Flanges 62
Fine Filter 63
Solenoid Venting Valve 63
Power Failure Venting Valve. 63
Power Failure Venting Valve, electromagnetically actuated 63
Purge Gas and Venting Valve 64
Gas Filter to G 1/4" for Purge Gas and Venting Valve. 64
Accessories for Serial Interfaces RS 232 C and RS 485 C 65
PC-Software LEYASSIST 65
Interface Adaptor for Frequency Converter with RS 232 C/RS 485 C Interface. 65

Miscellaneous

Services 66

Oil Diffusion Pumps **DIP, LEYBOJET, OB** 68

General

Applications and Accessories for Oil Diffusion Pumps 68
Oil for Diffusion Pumps, for different fields of application 68
Oil for Diffusion Pumps, for different pump types 69

Products

DIP Pumps, Water-Cooled 72
DIJ Pumps, Water-Cooled 76
Oil Booster OB 80
LEYBOJET 630, Water-Cooled 82

Accessories

Astrotorus Baffles 84
Temperature dependant Switching Components for Automatic Pump System Control 86
Monitoring Instruments 87
Power Controller 88
Adsorption Traps with Aluminium Oxide Insert 90
Right-Angle Valves, Electropneumatically Operated 92

Cryo Pumps, Cold Heads and Compressor Units **COOLVAC / COOLPOWER / COOLPAK** 94

General

Applications and Accessories
- Cryo Pumps 94
- Cryogenics 95

Cryo Pumps 96
Cold Heads 98
Refrigerating Capacity of Cryogenic Cold Heads 100
Compressor Units 101

Products

Cryo Pumps

Cryo Pumps with Fully Automatic Control
- iClassicLine
- COOLVAC 1500 iCL 102
- COOLVAC 2000 iCL, 3000 iCL 104
- COOLVAC 5000 iCL, 10000 iCL 108
- COOLVAC 18000 iCL, 30000 iCL, 60000 iCL 112

Cryo Pumps with Liquid Nitrogen Cooling of Radiation Shield and Baffle of Cryo Pump
- COOLVAC 30000 BL LN_2, 60000 BL LN_2 115

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Cryogenics

Cold Heads
Pneumatically driven
Single-Stage Cold Head COOLPOWER 50 and 140 T 118
Dual-Stage Cold Heads COOLPOWER 7/25, 5/100 and 5/100 T 120

Mechanically driven
Single-Stage Cold Head COOLPOWER 250 MD and Dual-Stage Cold Head COOLPOWER 10 MD . 122

Compressor Units
for pneumatically driven cold heads and pumps
with water cooling
COOLPAK 2000/2200 125
COOLPAK 6000 H/6200 H/6000 HD 128
for mechanically driven cold heads and pumps
with water cooling
COOLPAK 6000 HMD/6200 HMD 130
General Accessories for Compressor Units COOLPAK 132

Accessories

Cryo Pumps / Cryogenics

Controllers and Monitoring Units for Cryo Pumps. 134

COOLVAC iClassicLine, System Configuration
Single Operation 138
Dual and Multiple Operation 139

Low Temperature Measurement Instrument MODEL 211S 141

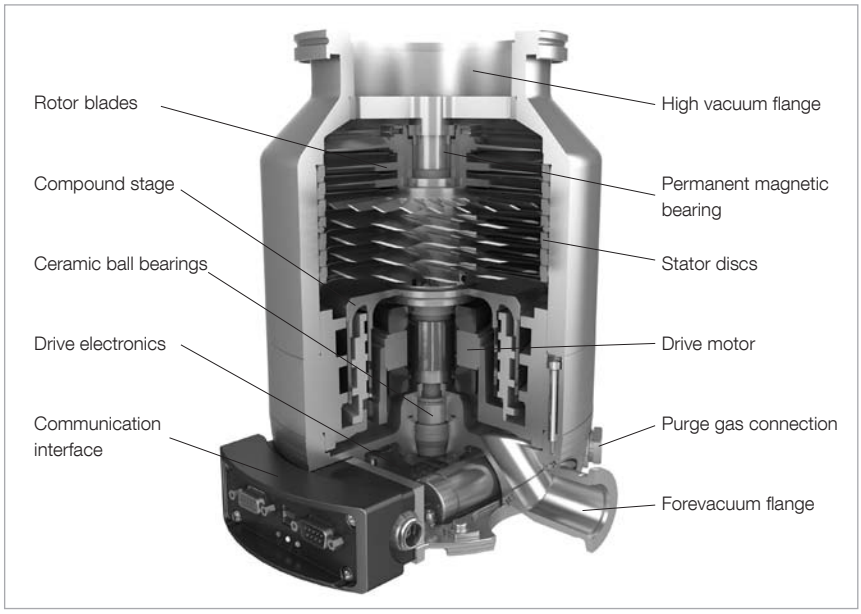
Temperature Sensor 142

General to TURBOVAC Pumps

Turbomolecular vacuum pumps (TURBOVAC) are used in applications which require a clean high or ultrahigh vacuum like, for example, in research, development or in industrial fields like the semiconductor industry, analytical instrumentation or coating technology.

Principle of Operation

In principle, the turbomolecular pump is a turbine rapidly revolving in a housing where the rotor stages of the turbine are equipped with a number of rotor blades. Located between the rotating rotor blades are stationary stator disks with blades arranged in the opposite direction. By means of a momentum transfer from the rotating rotor blades to the gas molecules their initially non-directional thermal motion is changed in to a directional motion from the inlet flange of the pump in the axial direction towards the forevacuum flange. In the molecular flow range (i.e. at pressures below 10^{-3} mbar (0.75 x 10^{-3} Torr)) the mean free path of the gas molecules is larger then the spacing between the rotor and the stator blades (typically a few tenths of a millimetre). Correspondingly the molecules chiefly collide with the optically dense rotor blades, resulting in a highly efficient pumping action. In the laminar flow range (i.e. at pressures over 10^{-1} mbar (0.75 x 10^{-1} Torr)) the effect of the rotor is impaired by frequent collisions between molecules themselves. For this reason, a turbomolecular pump is not capable of pumping gases at atmospheric pressure.



Sectional drawing of a turbomolecular pump (TURBOVAC i)

Rotor Bearing

Leybold offers different rotor bearing systems. A purely classic mechanical type of rotor bearing (TURBOVAC) or a magnetic rotor bearing (TURBOVAC MAG) and also a hybrid bearing (TURBOVAC i / iX) where the bearing on the forevacuum side is a ceramic ball bearing lubricated for life and where the bearing on the high vacuum side is implemented by way of a non-wearing magnetic bearing. Typical for all these types of bearing is that they do not require any lubricating oil which under circumstances like standstill of the pump might diffuse back into the vacuum chamber due to the lack of any pumping action.

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Drive Electronics/Control Unit

Driving and monitoring the turbomolecular pump requires an electronic frequency converter (inverter). The frequency converter delivers the driving voltage and the output frequency for the motor and also automatically monitors the system. Optimum running up of the pump rotor is attained by a steadily increasing voltage and frequency feed. After attaining the nominal speed, the start-up current is reduced in a controlled manner to the level necessary for normal operation.

The frequency converter and the motor of the TURBOVAC have been designed for a minimal drop of speed even at high intake pressures. This ensures the highest possible gas throughput also in the transition range from molecular to viscous flow

Depending on the given system and installation conditions, the control unit may be supplemented by a comprehensive range of optional accessories facilitating easy integration within existing installations.

Forevacuum Pump

Since turbomolecular pumps are not capable of compressing directly against atmospheric pressure their operation will always require a sufficiently rated forevacuum pump. For the classic rotor arrangement with rotor blades, generally two-stage rotary vane pumps (TRIVAC) will be suitable. In some cases also single-stage rotary vane vacuum pumps (SOGEVAC BI) or scroll vacuum pumps (SCROLLVAC).In the case of the wide range variant where the rotor is equipped with an additional compression stage (compound stage) also diaphragm vacuum pumps (DIVAC) may be used.

Characteristic Quantities

Pumping speed (volume flow rate)

The pumping speed “S” is the conveyed volume flow through the intake opening of the pump. It is dependent on the type of gas so that for this reason the nominal pumping speed, i.e. the maximum attainable pumping speed of the pump is commonly stated for air, respectively nitrogen. In the field of high vacuum engineering it is common to state the pumping speed in the unit of measurement [l/s]. The pumping speed is a nonlinear function of the inlet pressure $S = S(p_1)$.

Gas throughput

Gas throughput “Q”, unit of measurement [mbar x l/s] is linked to the pumping speed through the inlet pressure.
$Q = Q(p_1) = p_1 \times S(p_1)$.

Compression

Compression “K” is defined as the ratio between the pressure on the forevacuum side of the turbomolecular pump and the pressure on the high vacuum side.
$K = K(p_{VV}) = p_{VV}/p_{HV}$.
Compression is dependent on the type of gas.

Ultimate pressure (base pressure)

The ultimate pressure “p_{ult}” of a turbomolecular pump which can be baked out is defined through the ratio between forevacuum pressure and compression ratio which is attained in a test chamber 48 hours after a 24-hour bake-out (degassing) of the measurement arrangement.
$p_{ult} = p_{FV}/K_0$.

The maximum attainable ultimate pressure depends among other things on the cleanness of the apparatus, the type of forevacuum pump used, the types of seals used for the high vacuum flange and the bake-out conditions.

TURBOVAC Product Line

The TURBOVAC pumps are turbomolecular pumps with mechanical rotor suspension which are used in the pressure range from 10^{-1} mbar (0.75 x 10^{-1} Torr) to 10^{-10} mbar (0.75 x 10^{-10} Torr) Pumping speeds for air vary from 35 l/s (inlet flange diameter = 40 mm (1.57 in.)) to 1,150 l/s (inlet flange diameter = 250 mm (9.84 in.)).
Besides a variant with extremely reliable ceramic ball bearings on the forevacuum and the high vacuum side, Leybold also offers a line of turbomolecular pumps equipped with hybrid bearings which on the forevacuum side are equipped with a ceramic ball bearing and on the high vacuum side with a permanent magnetic bearing (TURBOVAC i line).

Owing to their compact design and ease of operation, these pump lines are used in all high vacuum and ultrahigh vacuum fields of application. In particular, the TURBOVAC pumps are running very successfully in mass spectrometers, in CD, DVD and hard disk production units, in the manufacture of large area optical coatings, in non-corrosive semiconductor production processes and in laboratories as well as research institutes

The most important advantages of the TURBOVAC product line are:

- Oil-free pumps for the generation of clean high and ultra-high vacuum conditions
- Highest performance in any orientation
- Highest degree of operating reliability
- Easy to operate
- Compact design



TURBOVAC (T) 350 iX

TURBOVAC MAG Product Line

The TURBOVAC MAG pumps are turbomolecular pumps with magnetic rotor suspension which are used in the pressure range from 10^{-1} mbar (0.75 x 10^{-1} Torr) to 10^{-10} mbar (0.75 x 10^{-10} Torr). Pumping speeds for air vary from 300 l/s (inlet flange diameter = 100 mm (3.94 in.)) to 2,200 l/s (inlet flange diameter = 250 mm (12.6 in.)).
The TURBOVAC MAG pumps are mostly installed in areas that require noise-free and vibration-free operation, have to be free of hydrocarbons and require long maintenance intervals. Electron beam microscopy, analytical technology and R & D are also important areas of application for these pumps.

The most important advantages of the TURBOVAC MAG product line are:

- Hydrocarbon-free pumps for the generation of clean high and ultra-high vacuum conditions
- High performance in any orientation
- High degree of operating reliability
- Extremely low vibration
- Almost maintenance-free



TURBOVAC MAG 2200 iPL

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Use of Turbomolecular Pumps in Analytical Instruments

All modern analytical methods for gas, liquid and plasma analysis – like for example GC-MS, LC-MS and ICP-MS – rely on mass spectrometers and for this reason require adequate high vacuum conditions. Also in electron microscopes and many surface analysis instruments the production of a high vacuum is essential. In over 90% of all high vacuum applications, the turbomolecular pump has been found to be ideal. Thanks to the hydrocarbon-free vacuum, most simple operation, compact design and almost maintenance-free operation it has in most cases displaced above all the diffusion pump.

On the basis of decades of experience and in cooperation with research facilities and the manufacturers of analytical instruments, Leybold has continually optimized its products.



TURBOVAC MAG W 600 iP

Through the TURBOVAC wide range series, a further improvement has been attained, making available to users in the area of analytical engineering highly flexible and reliable products.

Owing to the modular concept the user may adapt the vacuum system precisely to his requirements. The components can be integrated perfectly and thus find the most cost-effective system configuration. Through the introduction of the TURBOVAC multi inlet series, Leybold has, based on special customer requirements, achieved a major step ahead for analytical instruments.

Two or more analysis chambers can be pumped down simultaneously by a single multi-inlet pump. These pumps have been tailored for pumping speed and gas throughput in order to attain a higher detection sensitivity of analytical systems, for a smaller footprint and an increased sample throughput, for example. The benefits for the customers are the extreme compactness of the vacuum systems without sacrificing performance density, simple installation, stable vacuum connections and, compared to the use of discrete individual pumps, significantly lower investment costs for the entire system. The cartridge solution, moreover, allows for an innovative and cost-effective design of the customer's system and during servicing a simple replacement of the active unit without involved assembly work and leak searching.

Cartridge benefits, which convince

- Higher effective pumping speed
- No losses in conductance
- Compact vacuum system
- Easy pump replacement without having to disassemble the highly sensitive mass spectrometer chambers

The benefits for the customers are reflected by the efficiency of the analytical instruments:

- Increase in detection sensitivity
- Smaller analytical systems
- Increase in sample throughput
- Reduction of system costs
- Lower maintenance costs

In combination with backing pumps like the SOGEVAC, TRIVAC or SCROLLVAC, Leybold is able to offer the best vacuum system optimized for all major applications in the area of analytical instrumentation.



TURBOVAC i Multi Inlet

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Use of Turbomolecular Pumps in the Area of Coating Systems

Coating of optical and magnetic storage media, optical components as well as architectural glass requires high vacuum conditions. This is the only way to ensure that the formed layers will be uniform and adhere to the substrate.

The way in which the vacuum is generated has a significant impact on the quality of the coating. By pumping the vacuum chamber down to pressures in the range of 10^{-6} mbar (0.75×10^{-6} Torr), interfering gas and water molecules are removed from the processing chamber. In the case of sputtering the coating process is run in the pressure range between 10^{-3} and 10^{-2} mbar (0.75×10^{-3} and 0.75×10^{-2} Torr), and in the case of evaporation coating, pressures below 10^{-4} mbar (0.75×10^{-4} Torr) are utilized.

The turbomolecular pump meets all requirements of the customers as to a hydrocarbon-free vacuum, very simple operation, compact design and almost maintenance-free operation in an almost ideal manner. The range of pumps from Leybold includes pumps with flange diameters ranging from 40 mm to 250 mm (1.57 in. to 9.84 in.) nominal width.

Thus the right pump is available for each application, be it coating of data memories (CD, DVD, hard discs), coating of tools and coating of precision lenses in the area of optical components, displays or architectural glass.

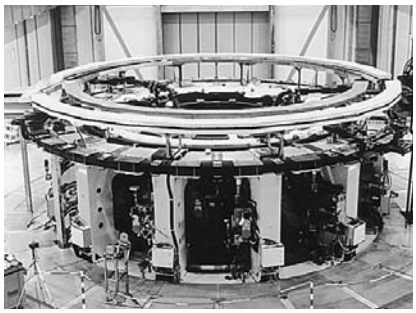


Coating of architectural glas

Use of turbomolecular pumps in research and development

In many applications in which new ideas shall be transformed into technical processes, vacuum technology is a basic requirement for being able to implement these processes at all.

In the field of research and development, all types of turbomolecular pumps from Leybold are being used. Since the application requirements differ widely, for example are being used. Since the application requirements differ widely, for example between university basic research, industrial development, in research and in large laboratories, the right component or the matching system can be put together from the comprehensive range of equipment being offered.



Nuclear fusion technology

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Notes

Applications for TURBOVAC Pumps

Pumps / Applications	TURBOVAC 90 i, (T) 250/350/450 i	TURBOVAC 90 iX, (T) 250/350/450 iX	TURBOVAC i Multi Inlet	MAG W 300/400/600/700 iP	MAG W 1300/1600/1700/2200 iP(L)	MAG 1601/2201 iP(L)	MAG W 300/400/600/700 P
Applications							
Analytical Instruments							
Leak detectors	■			■	■		■
Mass spectrometers	■		■	■	■		■
Gas chromatography (GC-MS)	■		■	■	■		■
Liquid chromatography (LC-MS)	■		■	■	■		■
Quadrupol time of flight (Q-TOF)	■		■	■	■		■
Matrix assisted laser desorption time of flight (MALDI-TOF)	■		■	■	■		■
Inductively coupled plasma mass spectrometry (ICP-MS)	■		■	■	■		■
Electron beam microscopy	■	■		■	■		■
Coating							
Data storage / optical	■	■		■	■	■	■
Data storage / magnetic	■	■		■	■	■	■
Flat panel displays				■	■	■	■
Optical coating	■	■		■	■	■	■
Large area coating					■	■	
Decorative coating	■				■	■	
Metallization	■				■	■	
Wear protection					■	■	
Metallurgy					■	■	
R & D (Research and Development)							
Surface analysis	■			■	■		■
UHV / XHV systems	■	■		■	■		■
Particle accelerators				■	■		■
Fusion experiments				■	■		■
Space simulation				■	■		■
Semiconductor Processes							
Load locks and transfer chambers	■	■		■	■	■	■
PECVD				■	■	■	■
PVD	■			■	■	■	■
Ion implantation				■			■

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Accessories for TURBOVAC Pumps

Pumps / Accessories	TURBOVAC 90 i, (T) 250/350/450 i	TURBOVAC 90 iX, (T) 250/350/450 iX	TURBOVAC i Multi Inlet	MAG W 300/400/600/700 iP	MAG W 1300/1600/1700/2200 iP(L)	MAG 1601/2201 iP(L)	MAG W 300/400/600/700 P
Accessories							
Integrated Frequency Converter	■	■	■	■	■	■	
External Frequency Converter and Power Supply							■
24VDC Display Unit TURBO.CONTROL i	■	■					
Pump control unit with Power Supply TURBO.CONTROL 300	■	■					
Power Supply	■	■	■	■			
Mounting Kit	■	■	■				
Inlet screen / Splinter guard	■	■	■	■	■	■	■
Vibration absorber	■	■	■	■			■
Air cooling unit	■	■	■	■			■
Water cooling kit	■	■	■	■			■
Flange heaters for CF flanges	■	■	■	■			■
Venting valve	■	■		■			■
Purge gas valve	■	■	■	■	■	■	■
Purge gas and venting valve					■	■	
Power failure venting valve	■	■	■	■	■	■	■
Electronic brake module				■			■
Relay box	■	■	■				
Accessories for serial interfaces	■	■	■	■	■	■	■
Control Software for TURBOVAC	■	■	■	■	■	■	■

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

General to TURBOVAC i / iX Pumps

Turbomolecular Pumps with Hybrid Rotor Suspension (mechanical/magnetic)

TURBOVAC i, iX / T i, T iX

The TURBOVAC i / iX series is a modular line of turbomolecular vacuum pumps. With the integrated drive electronics (frequency converter) it forms a single unit.
In the development of the TURBOVAC i / iX special emphasis was placed on the maximum attainable pump performance in consideration of its footprint. The specially developed rotor/stator design, upon request with an additional compression stage, guarantees excellent performance data as to pumping speed, gas throughput and compression especially also for light gases.
In all pumps of this line, the bearing consists of a non-wearing permanent magnetic bearing on the high vacuum side and an oil-free ceramic ball bearing which is lubricated for life on the forevacuum side. For this reason, the usually required standard maintenance involving an oil change is no longer necessary.Th ec eramic ball bearing is replaceable on-site, should this be required.
The pumps are equipped as standard with a venting and purge gas facility for directly connecting a venting valve, purge gas valve or purge gas throttle to the pump.

Owing to the many possible combinations (electronics, pump stage design, housing and the range of accessories) the TURBOVAC i / iX can be flexibly adapted to the specific application in each case.
For example, in comparison with the TURBOVAC i, the TURBOVAC iX is equipped with an integrated vacuum system control unit which drives accessory components like vacuum gauge, valves, fans and forevacuum pumps. Moreover, numerous optionally available communication interfaces facilitate easy integration within your installation.
The pump stage design (rotor, stator and Holweck stage) can be selected specifically in consideration of the respective process requirements and offers variants for highest possible gas throughput, pumping speed and/or compression in single or multi-chamber systems. Equally comprehensive is the range of housing and flange variants being offered where the vacuum connections can be adapted flexibly to the on-site installation conditions. The comprehensive range of accessories completes the TURBOVAC i / iX line thereby extending the fields of application for these pumps.

Advantages to the User

- High pumping performance from a compact size
- Cost-effective price-to-performance ratio
- Highly reliable, maintenance-free bearing concept without oil lubrication
- Owing to the overall modular concept, individually adaptable to the respective conditions and requirements
- Variety of housings and flange options
- Easy and easily adaptable installation, any mounting position
- Easy process integration due to the numerous interfacing options
- Flexible accessory options (power supply, cooling, heating, venting, installation etc.)

Overview of Variants

Electronics Variants

All pumps are equipped with integrated drive electronics with a 24 V/48 V power supply which controls the amount of drive power and which monitors all pump functions.

The individual requirements with regard to communication interfaces and the functional scope of the driving options for accessory components can be covered through a number of different electronics variants.



Left: TURBOVAC i with standard interface
Centre: **TURBOVAC i** with Anybus interface extension
Right: **TURBOVAC iX** with integrated vacuum system control unit and Anybus interface extension

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Electronics Variants

TURBOVAC i (Standard)
Cost-effective solution equipped with basic functions and interfaces.

- Internal 24/48 V DC frequency converter
- Status LEDs
- Accessory connection for up to 2 controllable accessory components
- User-friendly interfaces (USB, RS 485, 15-pin digital I/O)



Standard interface USB, RS 485 and 15-pin digital I/O for TURBOVAC i

TURBOVAC i (Anybus interface extension)

Features like TURBOVAC I, additionally:

- User-friendly interfaces (USB, 15-pin digital I/O) and Anybus interface instead of the RS 485 for further interface options: RS 232, Profibus, Ethernet/IP (further interfaces upon request)



Anybus interface expansion for TURBOVAC i

TURBOVAC iX (Vacuum system control unit)
With integrated vacuum system control unit and Anybus interface extension.

Features like TURBOVAC i (Anybus interface extension), additionally:

- 3 outputs for controlling vacuum pump accessories
- 1 vacuum gauge head connection for powering and data recording of vacuum gauge heads and application of pressure data for pump system control
- Flexibly programmable software, for customising the configuration of the control connections



Integrated vacuum system control unit of the TURBOVAC iX

Performance Variants



TURBOVAC i, iX

The standard variant for UHV applications and compact pump system solutions. Owing to the additional Holweck compression stage it delivers a high pumping speed and a high compression especially for light gases, and due to its high forevacuum tolerance it is suited for operation in connection with diaphragm or scroll forevacuum pumps.



TURBOVAC T i, T iX

The “T” version with its classic rotor design without additional compression stage is suited for deployment under more stringent process conditions and high gas loads. Compared to the standard variant it stands for faster run-up times, increased gas throughput and an improved tolerance with regard to pumping of particle or dust containing media.



TURBOVAC i Multi-Inlet

The variant with a special rotor design and two or more inlets as an efficient and compact vacuum solution for multi-chamber systems. It allows for a high degree of system integration and convinces compared to systems with discreet turbomolecular pumps through its lower weight and smaller footprint as well as an increased reliability of the entire vacuum system through the reliance on fewer components compared to similar systems equipped with discrete turbomolecular pumps.

Housing and Flange Variants

The optimised rotor geometry has been specially adapted to the industrial standard sizes for maximum pump performance. Housings with ISO-K as well as CF flanges are available. Moreover, the standard housings with an additional inlet stage are available upon request.

Multiple inlet stages can be implemented through the **TURBOVAC Multi-Inlet**. Here in addition to the special cartridge solution which facilitates easy replacement in the field, also custom housing and chamber solutions are offered for utmost system integration.

Flexibility

The forevacuum connection on all pumps is rotatable thereby facilitating flexible installation within existing systems making optimum use of the available space. Moreover, the required amount of installation space may be reduced by a detachable cable connected interface module



Left: TURBOVAC i with radial forevacuum flange
Right: TURBOVAC i with axial forevacuum flange

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Accessories for TURBOVAC i, iX / T i, T iX

Power Supply TURBO.POWER integra

- Plug-and-play power supply for fitting underneath the pump, 100-240 V
  - for TURBOVAC (T) 350 i(X) and TURBOVAC (T) 450 i(X) only
- Including short connecting cable to the pump
- Also for benchtop placement (TURBOVAC 90/250/350/450) with optional extension cable (1, 3, 5 m (3.5, 10.5, 17.5 ft))
- Requires a country-specific mains cord (EU, US, UK …)



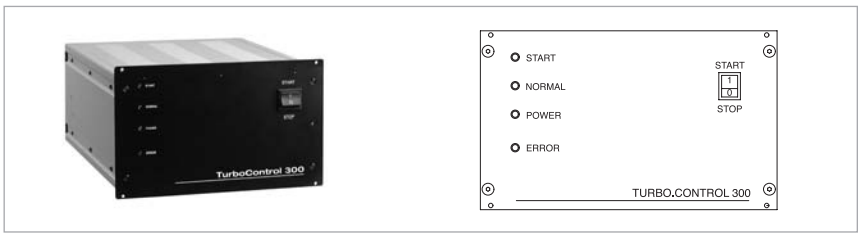
24VDC Display Unit TURBO.CONTROL i

- Control and monitoring of a TURBOVAC i/iX pump
- The 24 V/DC operating voltage comes from a plug power supply with round plug (24 V/DC - 1.5A - 36W)
- Can be installed in a rack or mounted in a table housing
- Has two communication channels (RS485 & USB) to the pump control and two interfaces for gauges. An ethernet provides the possibility of running a web server for the pump control and monitoring on an external PC and to read logged data via the TURBOCONTROL i.
- Requires a plug-in power supply an standard cable for communication
- The following measuring gauges can be attached:
  PTR 90, PTR 91 N, TTR 91,
  TTR 91 N, TTR101, TTR 101 N



Pump control unit with Power Supply TURBO.CONTROL 300

- Control unit and power supply for rack installation
- With on/off switch for the turbomolecular pump
- Status LEDs and status relays for monitoring the pump
- For remote control via interface
- Requires a connection cable to the pump (1, 3, 5 m (3.5, 10.5, 17.5 ft)) and country-specific mains cord (EU, US, UK ...)



Connecting cables to the pump with bare wire ends of for customer specific power supply units



Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Relay Box
The relay box allows you to control via the 24 V DC output on the TURBOVAC i a mains powered electric consumer, like a backing pump, for example. Mains power and consumer are connected using mains power cords, the control voltage is connected through an M 8 connector.

- incl. connection cable with a M 8 plug, 2 m (7.0 ft) long



DC Pump Plug
for adapting the supply voltage by the customer.

- 24/48 V DC-In plug TURBOVAC i



Radial air cooler
for lateral installation on the pump, including connection plug

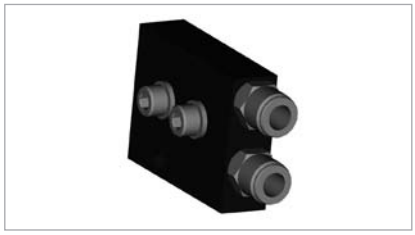
- Flexible positioning



Axial air cooler
For installation underneath the pump, including connection plug



Water cooling
for flexible installation on the pump (required for degassing the turbomolecular pump)



Heating Collar
for degassing the pump

- Degassing temperature 100 °C (212 °F)
- Requires a country-specific mains cord (EU, US, UK …)
- With optional relay box and accessory cable, automatic control via the electronics of the TURBOVAC i / iX is possible



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Accessory Valves

- Power supply 24 V DC
- G 1/8" inlet (inside thread) and discharge (outside thread) connection
- Including O-ring and connecting cable with M 8 plug for connection to the accessory input on the TURBOVAC i / iX

Purge Gas Valve (for connection to the purge gas connection on the turbomolecular pump)

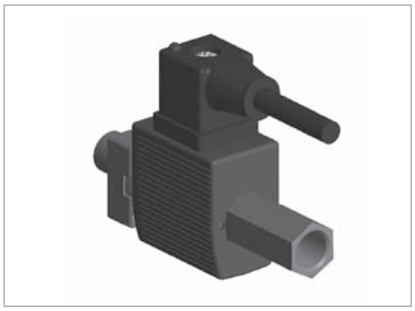
for controlling the admitted purge gas quantity

- The valve is closed when no power

Venting Valve (for connection the venting connection)

for venting the turbomolecular pump

- The valve is normally closed



Power Failure Venting Valve (for connection the venting connection)

for venting the turbomolecular pump

- The valve is normally open

Purge Gas Throttle

for passively controlling the admitted purge gas quantity

- G 1/8" inlet (inside thread) and discharge (outside thread) connection
- Purge gas throttle 24 sccm



Air Filter

for connection to the valves or throttles

- Prevents contamination and clogging of valves and throttles
- G1/8"



Y-Splitter

- Extends the M 8 accessory connection on the TURBOVAC i by a further connection for parallel driving of two accessory components.
  Here both accessory components are switched synchronously



Installation and Mounting Accessories

Mounting kit for safe mounting of the pump

The mounting kits include:
ISO-K kit (100 und 160):
centering rings and clamps
ISO-F kit (100 und 160):
collar flange, outside ring, bolts and nuts
CF kit (100 und 160):
2 copper gaskets, bolts, nuts and washers



Mounting kits (left ISO-KF, centre ISO-F, right CF)

Centering Rings with Splinter Guard (DN 100 and 160 ISO-K/F)

Centering Rings with Inlet Screens (DN 100 and 160 ISO-K/F)

Splinter Guards (DN 100 und 160 CF)

Inlet Screens (DN 100 und 160 CF)

for protecting the pump against ingesting parts.

Inlet screen, 3.2 mm (0.01 ft) mesh
Splinter guard, 0.8 mm (0.003 ft) mesh

Note:
For ISO-K/F, both inlet screen and splinter guard have been integrated in the centering ring.



Vibration Absorber (DN 100/160 ISO-K and 100/160 CF)

Prevents any possible vibration transfer from the pump to sensitive instrumentation or apparatus.



Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Software LEYASSIST *

Software for PC-based communication, control and monitoring of turbomolecular pumps via USB, RS 485 or RS 232 interface with automatic pump detection.

Functions

- Display of vacuum system status
- Trend configuration and report
- Configuring the accessory functions of the TURBOVAC i / iX
- Reading/writing of parameters
- Data logging
- Alarm/warning message logging
- Interface uses USB (with USB cable 2.0, Type A/B, 1.8 m (6.3 ft) long), RS 485 or RS 232 (with dongle)
  - Functions: reading/writing of parameters, control and data acquisition
- Automatic detection of connected Leybold pump type or instrument
- Different languages and with different user access levels are available



* included in delivery of TURBOVAC iX

Ordering Information

Software LEYASSIST for turbomolecular vacuum pumps	**Part. No. 230439V01**

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Products

TURBOVAC
with Hybrid Rotor Suspension (mag/mech)

with integrated Frequency Converter
TURBOVAC 90 i, 250 i, (T) 350 i and (T) 450 i



TURBOVAC 90 i (left), 250 i (T), 350 i and (T) 450 i (right)

with integrated Frequency Converter and integrated Vacuum System Controller
TURBOVAC 90 iX, 250 iX, (T) 350 iX and (T) 450 iX



TURBOVAC 90 iX (left), 250 iX, (T) 350 iX and (T) 450 iX (right)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Typical Applications

- Analytical technologies / Research & Development
  - Mass spectrometers
  - Electron microscopes
  - Surface analysis
  - X-ray-analysis
  - Particle accelerators and synchrotons
  - Laboratory coating systems
  - MBE (Molecular Beam Epitaxy)
  - UHV systems
- Life Sciences
  - Proton therapy
  - Gamma sterilisation
  - Production of high quality implants
- Industrial and Coating applications
  - PVD- Physical Vapour deposition
  - Optical coatings
  - CD/DVD/Blu-Ray Disc production
  - Thin film technologies, photovoltaics
- Load locks, transfer chambers, handling systems
- Electron beam welders
- Insulation vacuum and leak detection

Technical Features

TURBOVAC i

- Integrated electronic drive unit with 24/48 V DC supply
- Best in class pumping speed and compression especially for light gases
- Vacuum port design flexibility
- Installation in any orientation
- Superior reliability due to innovative pump and bearing design
- The only maintenance free hybrid mechanical TMP
  - no need for oil changes
- On-site maintenance possibility (bearing exchange) to reduce service costs and time
- Widest range of interface options (USB, RS 485 and 15 pin digital I/O as standard)
- Optimized size/performance ratio on 100 and 160 flanges

TURBOVAC iX

- Integrated vacuum system controller with flexible interfaces and several accessory ports for control of cooling units, valves, gauges, forevacuum pumps etc.
- Flexible accessory program options for easy plug & play
- Flexibility to match different process and application requirements

TURBOVAC T i, T iX

- Variant without Compound Stage
- increased gas throughput
- Increased tolerance against dust and particles
- Improved run-up time

Advantages to the User

TURBOVAC i

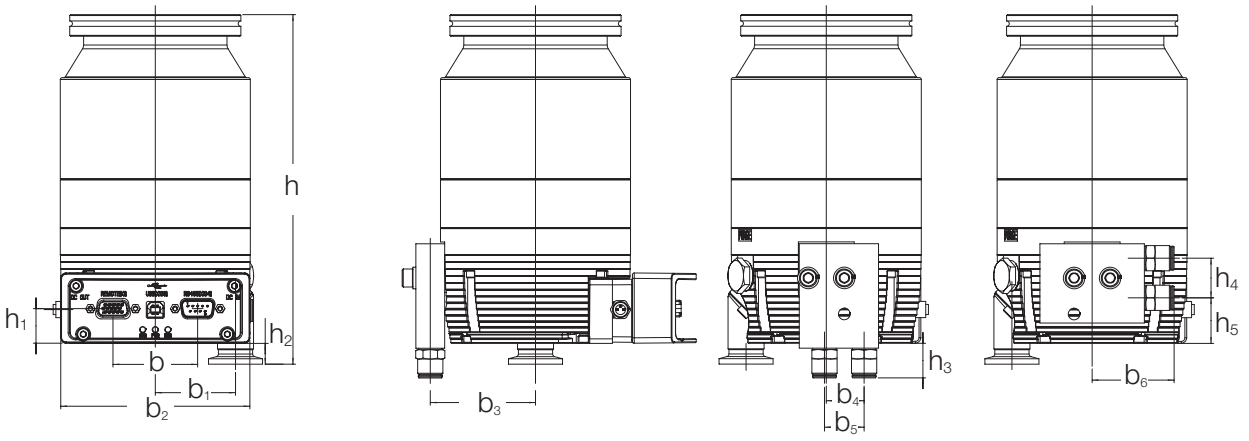
- Best performance and functionality for your money
- Maximum user flexibility for easy system integration, operation and control
- Highest productivity and system uptime at lowest CoO (Cost of Ownership)
- Improved pump-down time and target pressures
- Superior pumping performance for light gases
- Down-sizing of vacuum system in terms of costs and dimensions (use of small forevacuum pumps)

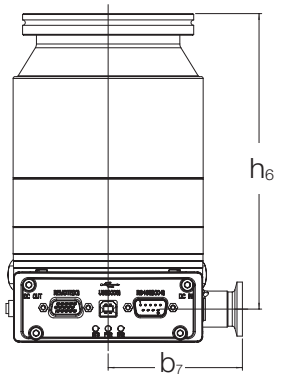
TURBOVAC iX

- Easy plug & play pump system control
- Avoid extra costs for separate pump system control units and cabling

TURBOVAC T i, T iX

- Suitable for demanding process applications and high throughput operation
- Fast cycle operation and pump down possible

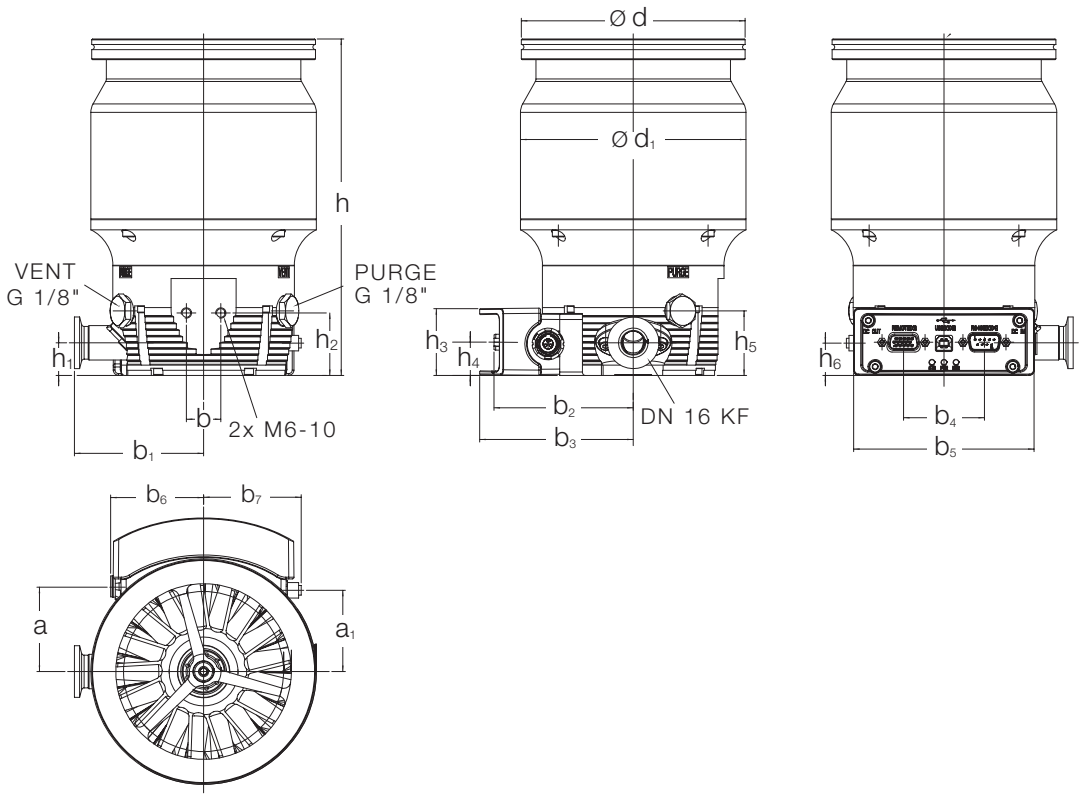




Typ	DN		a	a_1	b	b_1	b_2	b_3	b_4
TURBOVAC 90 i	ISO-K	mm (in.)	-	-	47 (1.85)	45 (1.77)	105 (4.13)	58 (2.28)	21 (0.83)
	CF	mm (in.)	-	-	47 (1.85)	45 (1.77)	105 (4.13)	58 (2.28)	21 (0.83)
TURBOVAC 250 i	ISO-K	mm (in.)	49 (1.93)	47 (1.85)	20 (0.79)	75 (2.95)	81 (3.19)	89 (3.50)	47 (1.85)
	CF	mm (in.)	49 (1.93)	-	20 (0.79)	75 (2.95)	81 (3.19)	89 (3.50)	47 (1.85)

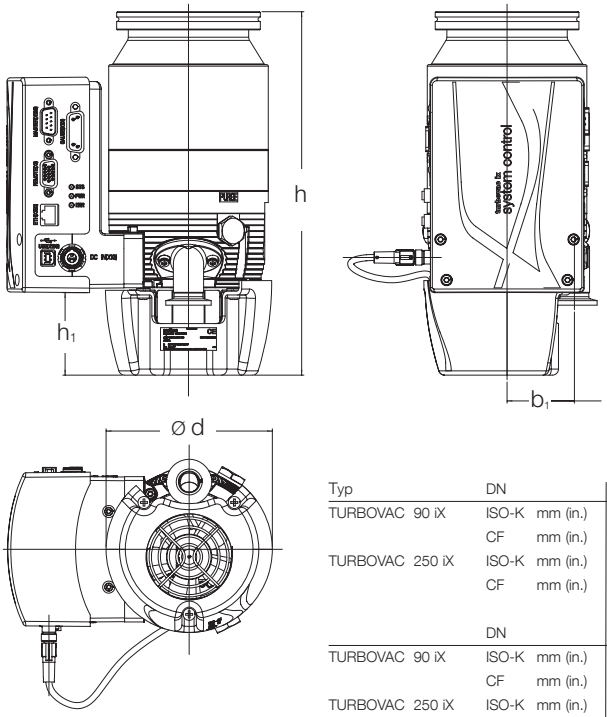
	DN		b_5	b_6	b_7	d	d_1	h	h_1
TURBOVAC 90 i	ISO-K	mm (in.)	22 (0,87)	46 (1.81)	75 (2.95)	110 (4.33)	-	194 (7.64)	19 (0.75)
	CF	mm (in.)	22 (0,87)	46 (1.81)	75 (2.95)	110 (4.33)	-	194 (7.64)	19 (0.75)
TURBOVAC 250 i	ISO-K	mm (in.)	105 (4.13)	54 (2.13)	57 (2.24)	130 (5.12)	131 (5.16)	196 (7.32)	19 (0.75)
	CF	mm (in.)	105 (4.13)	54 (2.13)	52 (2.05)	151.5 (5.96)	131 (5.16)	205 (8.07)	19 (0.75)

	DN		h_2	h_3	h_4	h_5	h_6
TURBOVAC 90 i	ISO-K	mm (in.)	12 (0.47)	19 (0.75)	22 (0,87)	25 (0.98)	164 (6.46)
	CF	mm (in.)	12 (0.47)	19 (0.75)	22 (0,87)	25 (0.98)	164 (6.46)
TURBOVAC 250 i	ISO-K	mm (in.)	36 (1.41)	39 (1.54)	19 (0.75)	38 (1.50)	19 (0.75)
	CF	mm (in.)	36 (1.41)	39 (1.54)	19 (0.75)	38 (1.50)	19 (0.75)



Dimensional drawing for the TURBOVAC pumps, 90 i top and 250 i bottom

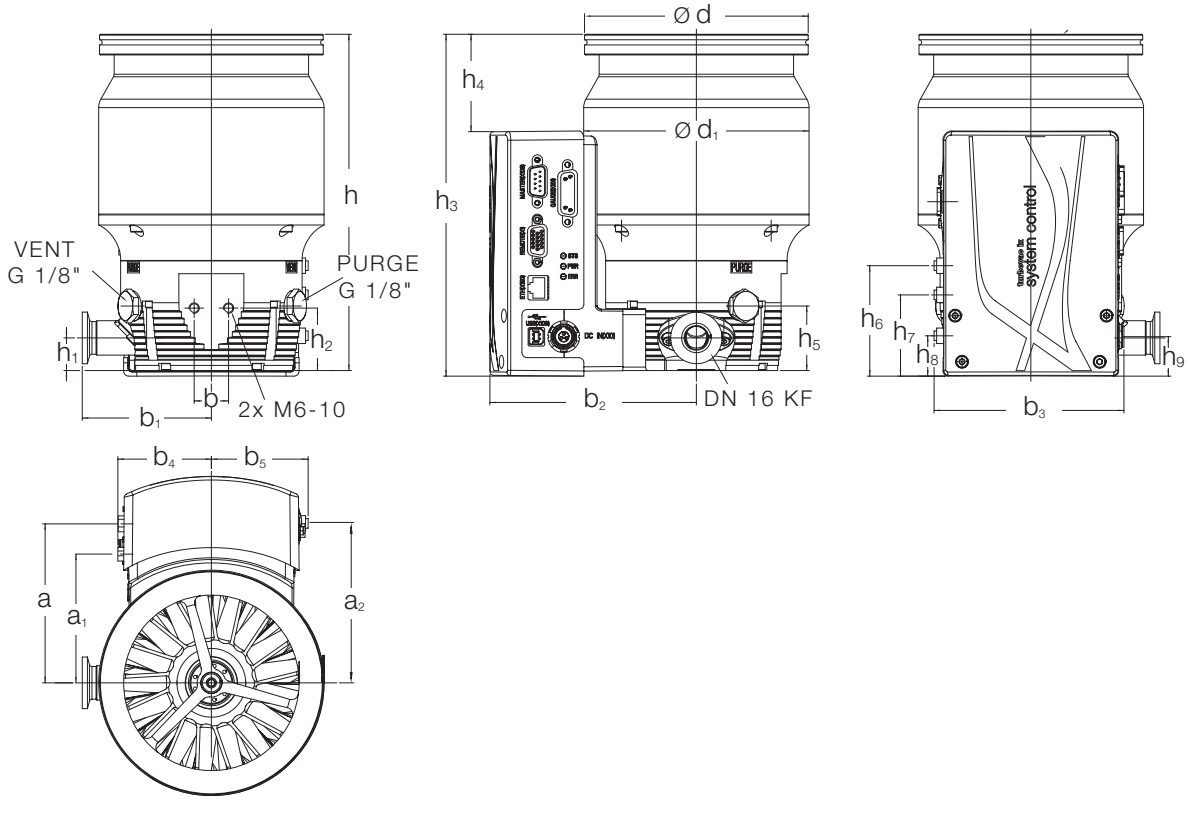
Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com



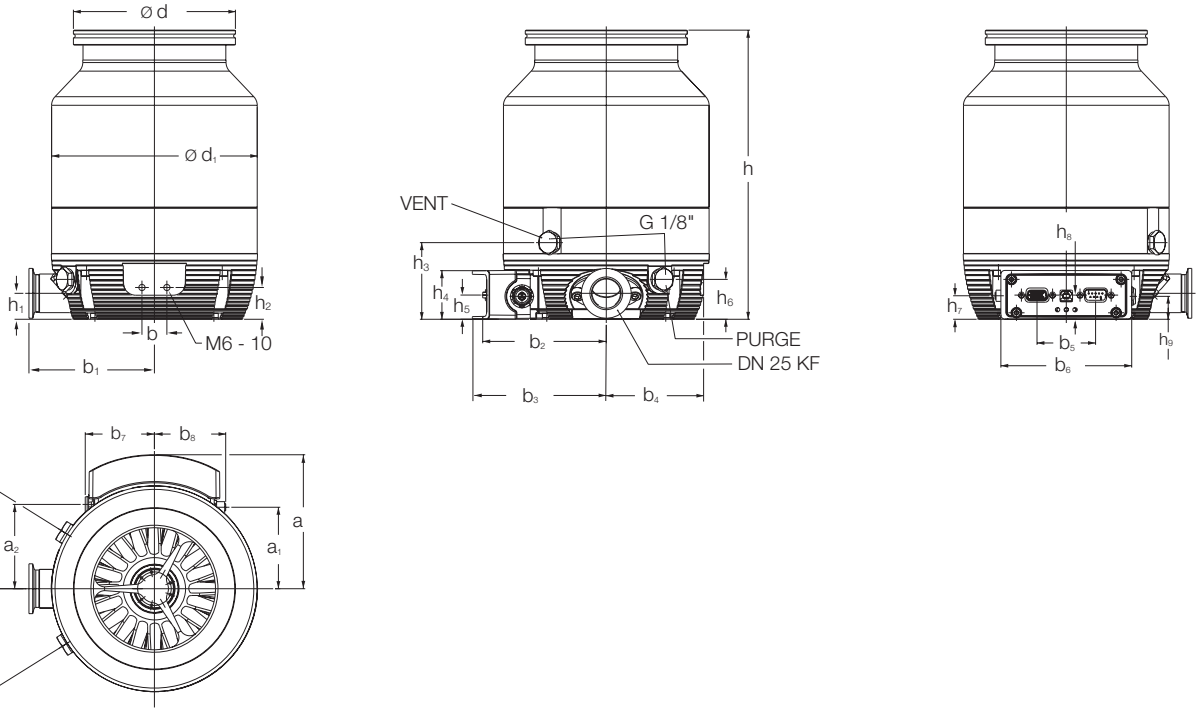
Typ	DN		a	a_1	a_2	b	b_1	b_2	b_3
TURBOVAC 90 iX	ISO-K	mm (in.)	-	-	-	-	45 (1.77)	-	-
	CF	mm (in.)	-	-	-	-	45 (1.77)	-	-
TURBOVAC 250 iX	ISO-K	mm (in.)	92 (3.62)	75 (295)	93 (3.66)	20 (0.79)	75 (2.95)	120 (4.72)	110 (4.33)
	CF	mm (in.)	92 (3.62)	75 (295)	93 (3.66)	20 (0.79)	75 (2.95)	120 (4.72)	110 (4.33)

	DN		d	d_1	h	h_1	h_2	h_3	h_4
TURBOVAC 90 iX	ISO-K	mm (in.)	110 (4.33)	-	240 (9.45)	55 (2.16)	-	-	-
	CF	mm (in.)	110 (4.33)	-	240 (9.45)	55 (2.16)	-	-	-
TURBOVAC 250 iX	ISO-K	mm (in.)	130 (5.12)	131 (5.16)	196 (7.72)	19 (0.75)	36 (1.42)	199 (7.83)	57 (2.24)
	CF	mm (in.)	151,5 (5.96)	131 (5.16)	205 (8.07)	19 (0.75)	36 (1.42)	208 (8.19)	66 (2.60)

	DN		h_5	h_6	h_7	h_8	h_9
TURBOVAC 90 iX	ISO-K	mm (in.)	-	-	-	-	-
	CF	mm (in.)	-	-	-	-	-
TURBOVAC 250 iX	ISO-K	mm (in.)	38 (1.50)	64 (2.52)	47 (1.85)	23 (0.91)	23 (0.91)
	CF	mm (in.)	38 (1.50)	64 (2.52)	47 (1.85)	23 (0.91)	23 (0.91)



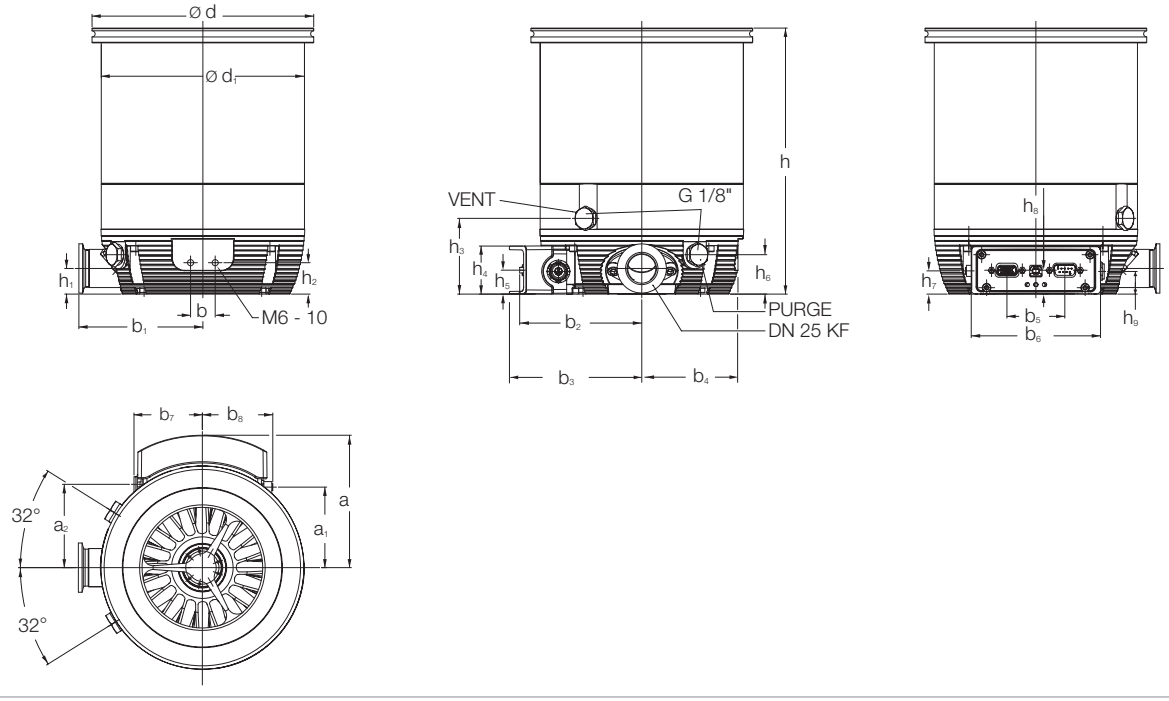
Dimensional drawing for the TURBOVAC pumps, 90 iX top and 250 iX bottom



Type	DN		a	a_1	a_2	b	b_1	b_2	b_3	b_4
TURBOVAC (T) 350 i	ISO-K	mm (in.)	107.5 (4.23)	65.4 (2.57)	67.6 (2.66)	20 (0.79)	100.7 (3.96)	99.2 (3.91)	107.5 (4.23)	78.1 (3.07)
	CF	mm (in.)	107.5 (4.23)	65.4 (2.57)	67.6 (2.66)	20 (0.79)	100.7 (3.96)	99.2 (3.91)	107.5 (4.23	78.1 (3.07)
TURBOVAC (T) 450 i	ISO-K	mm (in.)	107.5 (4.23)	65.4 (2.57)	67.6 (2.66)	20 (0.79)	100.7 (3.96)	99.2 (3.91)	107.5 (4.23	78.1 (3.07)
	CF	mm (in.)	107.5 (4.23)	65.4 (2.57)	67.6 (2.66)	20 (0.79)	100.7 (3.96)	99.2 (3.91)	107.5 (4.23	78.1 (3.07)

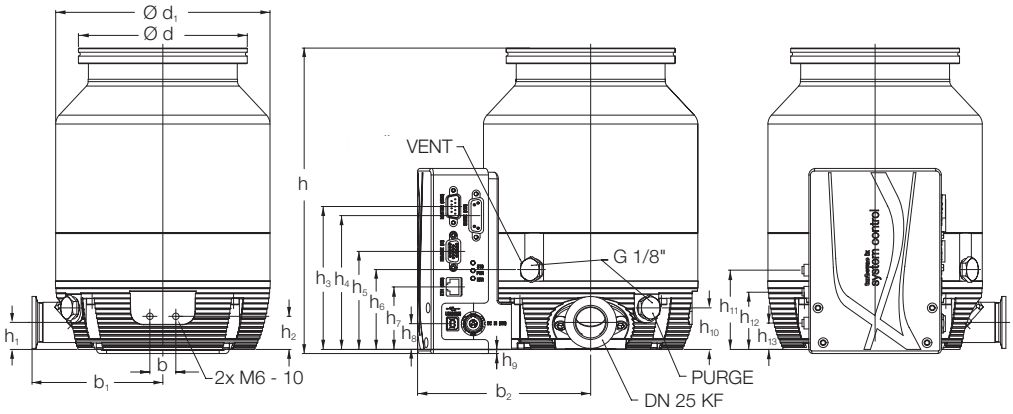
	DN		b_5	b_6	b_7	b_8	d	d_1	h	h_1
TURBOVAC (T) 350 i	ISO-K	mm (in.)	47 (1.85)	105 (4.13)	55.5 (2.19)	57.2 (2.25)	130 (5.12)	165 (6.5)	232 (9.13)	20.8 (0.82)
	CF	mm (in.)	47 (1.85)	105 (4.13)	55.5 (2.19)	57.2 (2.25)	180 (7.09)	165 (6.5)	245 (9.65)	20.8 (0.82)
TURBOVAC (T) 450 i	ISO-K	mm (in.)	47 (1.85)	105 (4.13)	55.5 (2.19)	57.2 (2.25)	130 (5.12)	165 (6.5)	216 (8.5)	20.8 (0.82)
	CF	mm (in.)	47 (1.85)	105 (4.13)	55.5 (2.19)	57.2 (2.25)	180 (7.09)	165 (6.5)	222 (8.74)	20.8 (0.82)

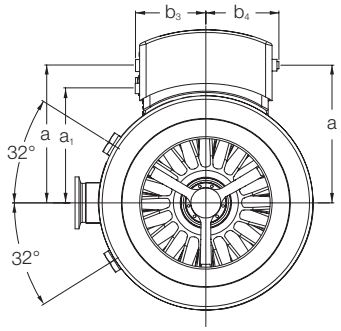
	DN		h_2	h_3	h_4	h_5	h_6	h_7	h_8	h_9
TURBOVAC (T) 350 i	ISO-K	mm (in.)	25.5 (1.0)	61.5 (2.42)	39 (1.54)	19.4 (0.76)	32 (1.26)	19 (0.75)	18.8 (0.74)	18.4 (0.72)
	CF	mm (in.)	25.5 (1.0)	61.5 (2.42)	39 (1.54)	19.4 (0.76)	32 (1.26)	19 (0.75)	18.8 (0.74)	18.4 (0.72)
TURBOVAC (T) 450 i	ISO-K	mm (in.)	25.5 (1.0)	61.5 (2.42)	39 (1.54)	19.4 (0.76)	32 (1.26)	19 (0.75)	18.8 (0.74)	18.4 (0.72)
	CF	mm (in.)	25.5 (1.0)	61.5 (2.42)	39 (1.54)	19.4 (0.76)	32 (1.26)	19 (0.75)	18.8 (0.74)	18.4 (0.72)



Dimensional drawing for the TURBOVAC (T) pumps, 350 i top and 450 i bottom

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

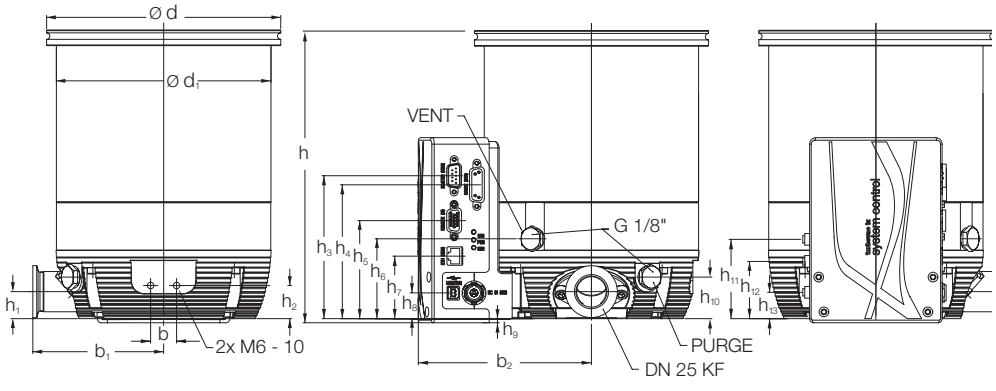


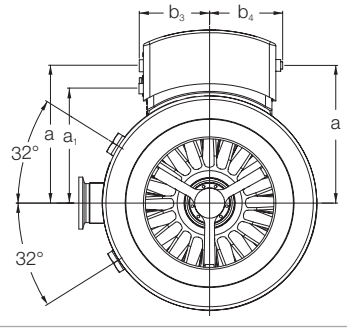


Type	DN		a	a_3	b	b_1	b_2	b_3	b_4
TURBOVAC (T) 350 iX	ISO-K	mm (in.)	111 (4.37)	78 (3.07)	20 (0.79)	101 (3.98)	138 (5.43)	54 (2.13)	56 (2.2)
	CF	mm (in.)	111 (4.37)	78 (3.07)	20 (0.79)	101 (3.98)	138 (5.43)	54 (2.13)	56 (2.2)
TURBOVAC (T) 450 iX	ISO-K	mm (in.)	111 (4.37)	78 (3.07)	20 (0.79)	101 (3.98)	138 (5.43)	54 (2.13)	56 (2.2)
	CF	mm (in.)	111 (4.37)	78 (3.07)	20 (0.79)	101 (3.98)	138 (5.43)	54 (2.13)	56 (2.2)

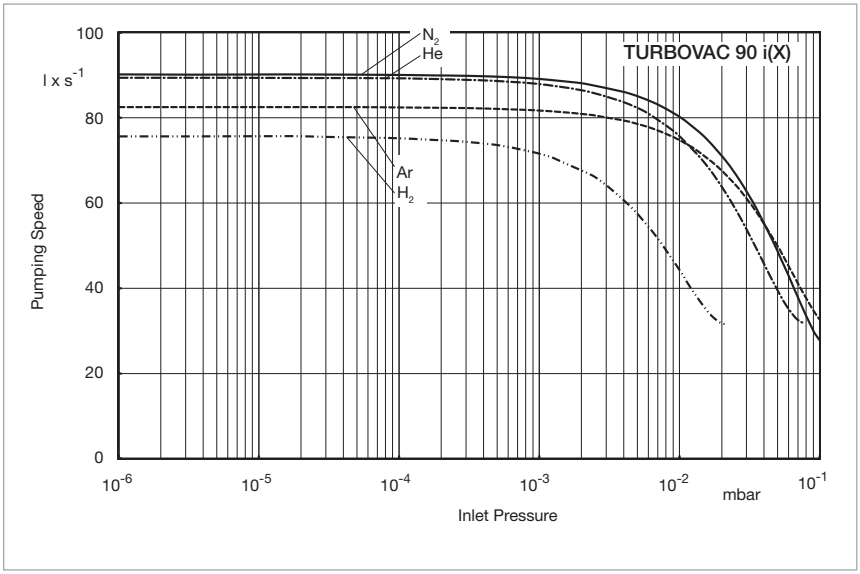
	DN		d	d_1	h	h_1	h_2	h_3	h_4	h_5
TURBOVAC (T) 350 iX	ISO-K	mm (in.)	130 (5.12)	165 (6.5)	235 (9.25)	21 (0.83)	26 (1.02)	110 (4.33)	103 (4.06)	76 (2.99)
	CF	mm (in.)	180 (7.09)	165 (6.5)	248 (9.76)	21 (0.83)	26 (1.02)	110 (4.33)	103 (4.06)	76 (2.99)
TURBOVAC (T) 450 iX	ISO-K	mm (in.)	130 (5.12)	165 (6.5)	219 (8.62)	21 (0.83)	26 (1.02)	110 (4.33)	103 (4.06)	76 (2.99)
	CF	mm (in.)	180 (7.09)	165 (6.5)	225 (8.86)	21 (0.83)	26 (1.02)	110 (4.33)	103 (4.06)	76 (2.99)

	DN		h_6	h_7	h_8	h_9	h_{10}	h_{11}	h_{12}	h_{13}
TURBOVAC (T) 350 iX	ISO-K	mm (in.)	62 (2.44)	48 (1.89)	20 (0.79)	3 (0.12)	32 (1.26)	64 (2.52)	47 (1.85)	23 (0.91)
	CF	mm (in.)	62 (2.44)	48 (1.89)	20 (0.79)	3 (0.12)	32 (1.26)	64 (2.52)	47 (1.85)	23 (0.91)
TURBOVAC (T) 450 iX	ISO-K	mm (in.)	62 (2.44)	48 (1.89)	20 (0.79)	3 (0.12)	32 (1.26)	64 (2.52)	47 (1.85)	23 (0.91)
	CF	mm (in.)	62 (2.44)	48 (1.89)	20 (0.79)	3 (0.12)	32 (1.26)	64 (2.52)	47 (1.85)	23 (0.91)

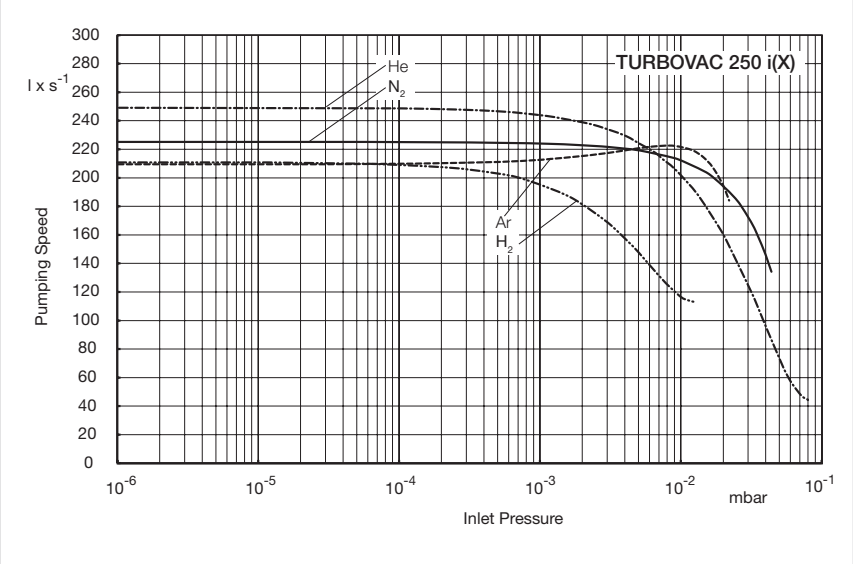




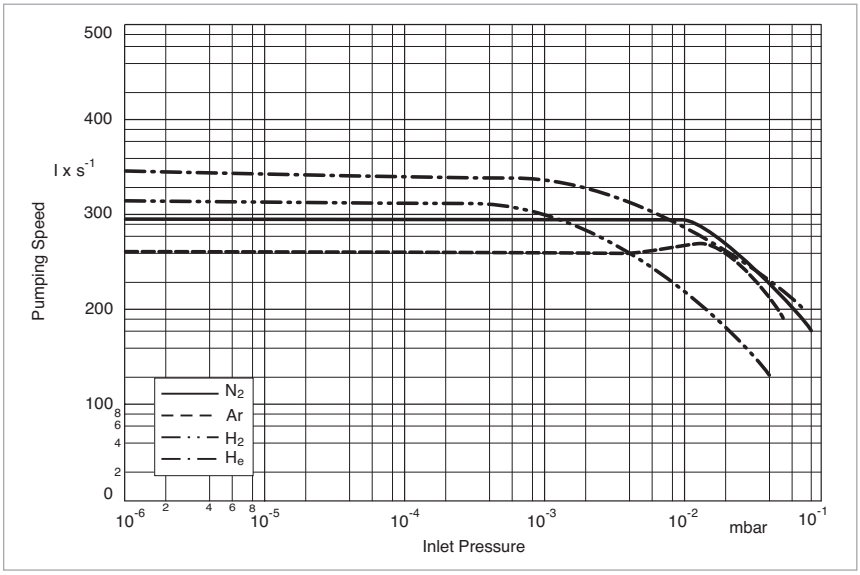
Dimensional drawing for the TURBOVAC (T) pumps, 350 iX top and 450 iX bottom



Pumping speed as a function of the inlet pressure for the TURBOVAC 90 i (DN 63 Flange)

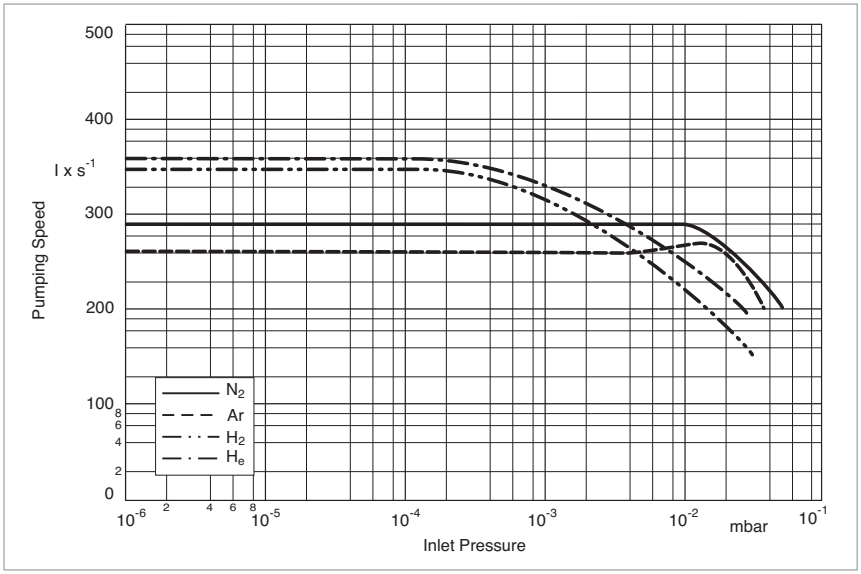


Pumping speed as a function of the inlet pressure for the TURBOVAC 250 i

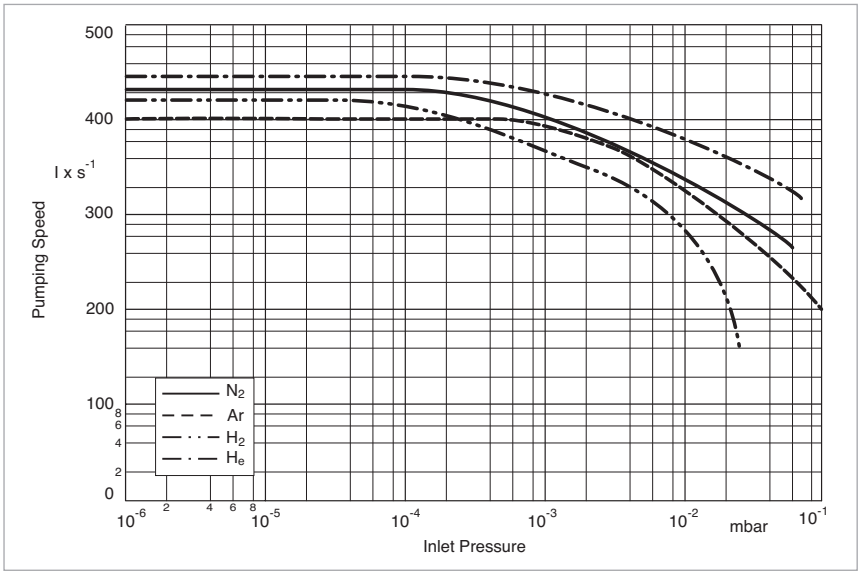


Pumping speed as a function of the inlet pressure for the TURBOVAC 350 i

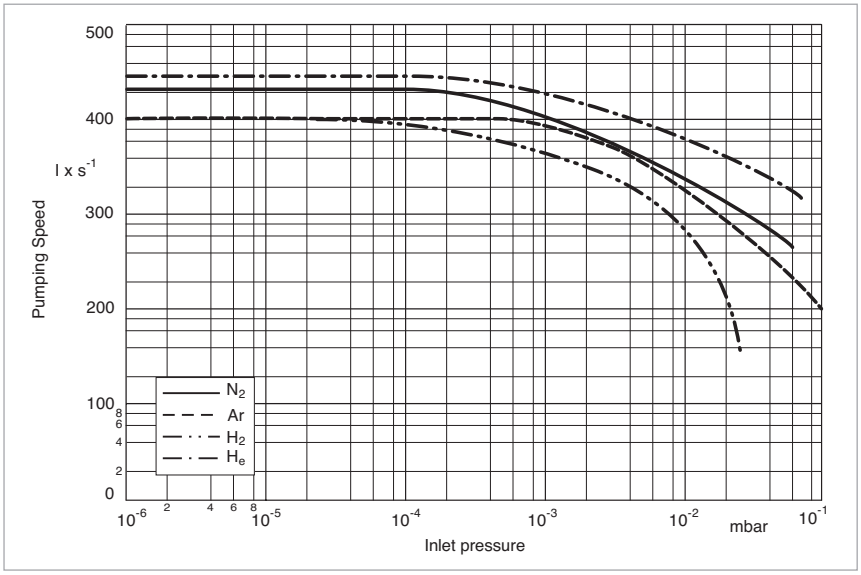
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



Pumping speed as a function of the inlet pressure for the TURBOVAC T 350 i



Pumping speed as a function of the inlet pressure for the TURBOVAC 450 i



Pumping speed as a function of the inlet pressure for the TURBOVAC T 450 i

Technical Data

		TURBOVAC					
		90 i/iX	250 i/iX	350 i/iX	450 i/iX	T 350 i/iX	T 450 i/iX
High-vacuum connection	DN	63 ISO-K 63 CF	100 ISO-K 100 CF	100 ISO-K 100 CF	160 ISO-K 160 CF	100 ISO-K 100 CF	160 ISO-K 160 CF
Forevacuum connection	DN	16 ISO-KF	16 ISO-KF	25 ISO-KF	25 ISO-KF	25 ISO-KF	25 ISO-KF
Pumping speed							
N_2	l/s	90	225	290	430	290	430
Ar	l/s	83	210	260	400	260	400
He	l/s	90	250	360	440	360	440
H_2	l/s	78	210	350	420	320	400
Gas throughput							
N_2	mbar x l/s	10	6	4.5	4.5	11.5	115
Ar	mbar x l/s	3	3	2	2	6	6
He	mbar x l/s	11	6	8	8	20	20
H_2	mbar x l/s	11	>10	8	8	20	20
Compression ratio							
N_2		1×10^{11}	1×10^{11}	1×10^{11}	1×10^{11}	1×10^{10}	1×10^{10}
Ar		1×10^{11}	1×10^{11}	1×10^{11}	1×10^{11}	1×10^{11}	1×10^{11}
He		-	-	1×10^{8}	1×10^{8}	1×10^{6}	1×10^{6}
H_2		5×10^{7}	2×10^{7}	1×10^{6}	1×10^{6}	1×10^{4}	1×10^{4}
Ultimate pressure with 2-stage oil-sealed rotary vane vacuum pump ISO-K / CF flange	mbar (Torr)	$< 8 \times 10^{-8}$ / $< 5 \times 10^{-10}$ ($< 6 \times 10^{-8}$ / $< 3.75 \times 10^{-10}$)					
Max. forevacuum pressure N_2	mbar (Torr)	14 (10.5)	14 (10.5)	10 (7.5)	10 (7.5)	0.5 (0.375)	0.5 (0.375)
Recommended forevacuum pumps							
	TRIVAC	D 2,5 E / D 4 B	D 2,5 E / D 4 B	D 4 B	D 4 B	D 16 B	D 16 B
	SCROLLVAC	SC 5 D	SC 5 D / 15 D	SC 5 D / 15 D	SC 5 D / 15 D	SC 15 D / 30 D	SC 15 D / 30 D
	DIVAC	1.4 HV3	3.8 HV3	3.8 HV3	3.8 HV3	–	–
Operating speed	min^{-1} (rpm)	72 000	72 000	60 000	60 000	60 000	60 000
Speed adjustment range	%	62 to 100	62 to 100	50 to 100	50 to 100	50 to 100	50 to 100
Run-up time, approx.	min	1.5	2	5.5	5.5	3.5	3.5
Ambient temperature							
during operation	°C	+5 to +45					
	(°F)	(+41 to +113)					
during storage	°C	-15 to -70					
	(°F)	(+5 to -94)					
Cooling							
standard		Convection					
optional		Air or water					
Cooling water connection		Plug connection for 6 x 1 hose					
alternatively		G 1/8" Screw-in thread					
Cooling water consumption	l/h	30 to 60	30 to 60	50 to 100	50 to 100	50 to 100	50 to 100
Permissible cooling water pressure	bar(g)	3 to 6					
Permissible cooling water temperature	°C	+15 to +35					
	(°F)	(+59 to +95)					
Noise level							
with convection cooling	db(A)	< 41	< 41	< 44	< 44	< 44	< 44
with radial cooler	db(A)	< 44	< 44	< 47	< 47	< 47	< 47
with axial cooler	db(A)	< 49	< 49	< 49	< 49	< 49	< 49

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Additional Technical Data for the Frequency Converter (i Version)

		TURBOVAC					
		90 i	250 i	350 i	450 i	T 350 i	T 450 i
Technical Data for the integrated Drive Electronics							
Supply voltage	V DC	24/48 ±10%					
Max. current consumption	A	10 at 24 V DC					
Max. power consumption	W	240					
Power consumption at ultimate pressure	W	20					
Type of protection	IP	40					
Interfaces		RS 485, USB, 15-pin digital I/O					
Other interfaces		Upon request					
Accessory connection		1 pcs. M 8 connector, 24 V DC					
Weight ISO-K / CF	kg (lbs)	3.1 / 4.8 (6.8 / 10.6)	4 / 6.6 (8.8 / 14.5)	7.5 / 11.5 (16.5 / 25.4)	7.7 / 12.5 (17.0 / 27.6)	7.0 / 11.0 (15.4 / 14.3)	7.2 / 12.0 (15.9 / 26.5)

Additional Technical Data for the Frequency Converter (iX-Version)

		TURBOVAC					
		90 iX	250 iX	350 iX	450 iX	T 350 iX	T 450 iX
Technical Data for the integrated Drive Electronics and Vacuum System Controller							
Supply voltage	V DC	24/48 ±10%					
Max. current consumption	A	10 at 24 V DC					
Max. power consumption	W	240					
Power consumption at ultimate pressure	W	20					
Type of protection	IP	40					
Interfaces		USB+,15 pin Standard, Anybus (either RS 485, RS 232, Profibus, ...)					
Accessory connections		3 pcs. M 8 connector, 24 V DC					
Max. load for the 24 V DC output (cooler or valve supply)	V / W	24 / max. 12					
Gauge head connection		15-way Sub-D					
Weight ISO-K / CF	kg (lbs)	3.6 / 5.3 (7.9 / 11.7)	4,5 / 7.1 (9.9 / 15.6)	8.0 / 12.0 (17.6 / 26.5)	8.2 / 13.0 (18.1 / 28.7)	7.5 / 11.5 (16.5 / 25.4)	7.7 / 12.5 (17.0 / 27.6)



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Ordering Information

TURBOVAC

	Wide Range				Classic	
	90 i	250 i	350 i	450 i	T 350 i	T 450 i
	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.
TURBOVAC with integrated frequency converter, RS 485, USB+ and 15-Pin digital I/O interface						
DN 40 ISO-K	810011V1000	–	–	–	–	–
DN 63 ISO-K	810031V1000	–	–	–	–	–
DN 63 CF	810041V1000	–	–	–	–	–
DN 100 ISO-K	–	820051V1000	830051V1000	–	830050V1000	–
DN 100 CF	–	820061V1000	830061V1000	–	830060V1000	–
DN 160 ISO-K	–	–	–	830071V1000	–	830070V1000
DN 160 CF	–	–	–	830081V1000	–	830080V1000
other interfaces	Upon request					

	Wide Range				Classic	
	90 iX	250 iX	350 iX	450 iX	T 350 iX	T 450 iX
	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.
TURBOVAC with integrated frequency converter, and vacuum system controller, RS 485, USB+ and 15-Pin digital I/O interface						
DN 63 ISO-K	810031V3300	–	–	–	–	–
DN 63 CF	810041V3300	–	–	–	–	–
DN 100 ISO-K	–	820051V3300	830051V3300	–	830050V3300	–
DN 100 CF	–	820061V3300	830061V3300	–	830060V3000	–
DN 160 ISO-K	–	–	–	830071V3300	–	830070V3300
DN 160 CF	–	–	–	830081V3300	–	830080V3300
other interfaces	Upon request					

Included in the Delivery of the Pump

High and forevacuum flanges are protective-capped

The flange mounting components and the inlet screen are not included in the delivery

Ordering Information

TURBOVAC (T)

90 i, iX / 250 i, iX / 350 i, iX / 450 i, iX

Mandatory Accessories P PS	Part No.
Power supply TURBO.POWER integra, including 0.3 (1.1 ft) long cable	800100V0003
Mains cable, 3 m (10.5 ft)	
EU plug	800102V0002
UK plug	800102V0003
US plug 5-15P, 115 V	800102V1002
Cable pump – TURBO.POWER integra	
1 m (3.5 ft)	800096V0100
3 m (10.5 ft)	800096V0300
5 m (17.5 ft)	800096V0500
Mounting kit TURBOVAC	
DN 63 ISO-K	800134V0010
DN 100 ISO-K	800134V0020
DN 160 ISO-K	800134V0030
DN 100 ISO-K to ISO-F	800134V0025
DN 160 ISO-K to ISO-F	800134V0035
DN 63 CF	800134V0011
DN 100 CF	800134V0021
DN 160 CF	800134V0031

Forevacuum pumps TRIVAC D 4 B and TRIVAC D 16 B see Catalog Part “Oil Sealed Vacuum Pumps”

Forevacuum pumps SCROLLVAC 7 plus to SCROLLVAC 18 plus and DIVAC 3.8 HV3 see Catalog Part “Dry Compressing Vacuum Pumps”

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Accessories, optional	P	Part No.
Power supply, cable, other accessories		
24VDC display unit TURBO.CONTROL i		800100V0004
Plug-in power supply 24 V/DC – TURBO.CONTROL i		800110V0027
Standard cable for communication – TURBO.CONTROL i		
USB cable 2.0 Type A/B, 1.8 m (5.9 ft)		800110V0108
RS485 cable, 5 m (16.4 ft)		800103V0029
RS485 cable, 1 m (3.3 ft)		800103V0027
Power supply and control unit TURBO.CONTROL 300		800100V0001
Cable pump – TURBO.CONTROL 300		
1 m (3.3 ft)		800092V0100
3 m (10.5 ft)		800092V0300
5 m (16.4 ft		800092V0500
Extension cable - only in combination with connecting cable 1m (3.5 ft)		
10 m (35 ft)		800092V1000
20 m (70 ft)		800092V2000
24/48 V DCIn plug TURBOVAC		800090V0000
USB-Kabel 2.0, Typ A/B, 1.8 m (5.9 ft) long		800110V0108
Y cable M 8		800110V0020
Relaybox for forevacuum pump, 1-phase, 10 A		800110V0030
Start stop switch		800110V0021
Cooling		
Air cooler		
TURBOVAC 90 i(X)		
radial		800136V0007
axial		800136V0008
TURBOVAC 250 i(X)		
radial		800136V0009
axial		800136V0008
TURBOVAC 350/450 i(X)		
radial		800136V0005
axial		800136V0006
Water cooling TURBOVAC i(X), connection thread G 1/8”		800135V0005
Water cooling TURBOVAC i(X), connection thread G 1/4”		800135V0006
Venting and purge gas		
Venting valve, 24 V DC, G 1/8"		800120V0012
Power failure venting valve, 24 V DC, G 1/8"		800120V0022
Purge gas valve, 24 V DC, G 1/8", 24 sccm		800120V0013
Purge gas throttle, 24 sccm		800120V0014
Air filter, G 1/8"		800110V0022
Heating		
Flange heater (needs mains cable, see above)		
DN 63 CF, 230 V		800137V0003
DN 63 CF, 115 V		800137V0004
DN 100 CF, 230 V		800137V0005
DN 100 CF, 115 V		800137V0006
DN 160 CF, 230 V		800137V0007
DN 160 CF, 115 V		800137V0008
Installation		
Vibration absorber		
DN 100 ISO-K		800131V1100
DN 160 ISO-K		500073
DN 100 CF		500071
DN 160 CF		500072
Centering ring		
with fine inlet screen, 0.8 mm (0.03") mesh		
DN 63 ISO-K/F		800133V0012
DN 100 ISO-K/F		800133V0022
DN 160 ISO-K/F		800133V0032
with coarse inlet screen, 3.2 mm (0.13") mesh		
DN 63 ISO-K/F		800133V0011
DN 100 ISO-K/F		800133V0021
DN 160 ISO-K/F		800133V0031
Fine Inlet screen, 0.8 mm (0.03") mesh		
DN 63 CF		800132V0012
DN 100 CF		800132V0022
DN 160 CF		800132V0032
Coarse inlet screen, 3.2 mm (0.13") mesh		
DN 63 CF		800132V0011
DN 100 CF		800132V0021
DN 160 CF		800132V0031

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Special Turbomolecular Pumps



TURBOVAC i Multi Inlet Cartridge

Precision is key when it comes to analytical instruments.

Outfitted with two or more inlets, the innovative turbopumps with integrated drive electronics provide extraordinary pumping performance and are adaptable to the system requirements of each instrument.

In combination with our support for the whole vacuum system design, it will result in the best possible level of pump system integration you have ever experienced.



The TURBOVAC 350-400 i Multi Inlet line has been especially developed to meet the requirements of analytical instruments and features an extremely high level of flexibility, allowing you to choose the number, height and position of the multiple vacuum ports. The result: a pump that is perfectly fitted to your specific performance needs and installation requirements.

Additionally, we offer the support and experience in vacuum system design which opens a wide range of possibilities, from the adaptation of the pump housing to your vacuum chamber through to the design of a custom-built housing/chamber that meets your particular needs. Your benefit: optimum system integration of the pump(s) into your instrument and a reduced time to market.

Your Advantage

- Perfect integration of the pump(s) within your instrumentation
- Cutting of system costs
- Smaller size of the analytical system
- Reduction in the number of individual vacuum components
- Choice between cartridge and custom pump housing

In order to simplify installation, operation and control, all TURBOVAC i variants feature an integrated electronic drive with 24/48 V DC supply and a detachable operator interface with USB, RS 485 and digital I/O connections.

Performance

- Industry-leading pumping speed especially for light gases (up to 60 % higher than existing products)
- Optimized rotor diameter to provide maximum pumping performance
- > 40 l/s pumping speed at Interstage port 2

Flexibility

- Vacuum port design flexibility
  - Rotatable fore-vacuum port
  - Multiple interstage ports
  - High level of flexibility in terms of height and position of vacuum ports
- Unique cartridge solutions for optimized system integration with fast and simple field replacement
- Special pump housing solutions adapted to your instrument
- Complete vacuum system design including your vacuum chamber
- Variable rotor and Holweck design to adapt the performance to your application

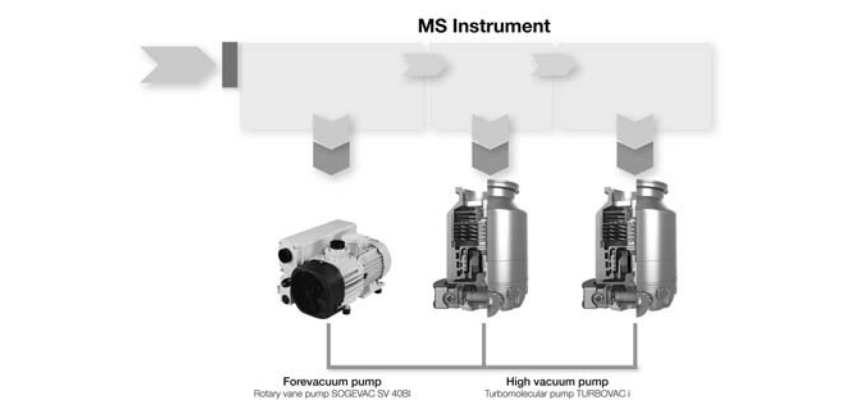
Installation, operation and control

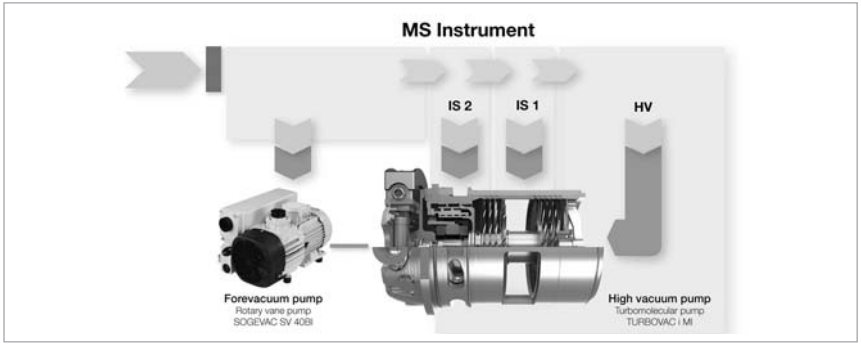
- Integrated 24/48 V DC drive electronics to avoid expensive cabling
- Widest range of communication interfaces: USB, RS 485 and remote 15 pin digital I/O as standard options
- Highly efficient motor
- Thermal isolation by design for optimized cooling of bearing and improved pump lifetime
- Simply-supported shaft reduces vibration
- Maintenance free upper passive magnetic bearing
- Oil free, lifetime lubricated lower mechanical ceramic ball bearing, field-replaceable

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Outstanding performance

Thanks to its variable rotor and drag stage design, our new Multi Inlet product line provides the highest performance for all mass spectrometer applications. With increased pumping speed levels especially for light gases which are up to 60% higher than those offered by other products currently on the market, it provides significant advantages for your instruments: lower pressures, improved detection sensitivity levels and higher sample throughput rates.





Superior reliability

The unique maintenance and oil free hybrid bearing system is characterized by its extreme reliability and durability – that's because we equipped it with an innovative lifetime lubrication system that never needs an oil change.
The simply-supported shaft system results in a low vibration pump design which reduces noise, mechanical stress and negative impact on vibration sensitive applications. Optimized cooling of the bearings is ensured through thermal isolation and the highly efficient motor. To protect the bearings from critical gases or particles, all pumps are equipped with a purge port. As a consequence, not only pump lifetime is increased significantly, but also system uptime as well as productivity. In combination with low costs of ownership, the operation of your vacuum system will be more efficient than ever.

Advantages to the User

- High gas throughput
- High effective pumping speed
- High efficiency for analytical instruments
- High detection sensitivity
- High sample throughput
- Free of hydrocarbons
- Hybrid bearing suspension for low vibration levels
- Space and weight saving
- Low component count
- Favourable price-to-performance ratio
- Installation and user friendly
- Practically maintenance free

Typical Applications

For example

- LC-MS (linking of a liquid chromatograph to a mass spectrometer)
- GC/MS (linking of a gas chromatograph to a mass spectrometer)
- TOF-MS (time-of-flight mass spectrometer)
- ICP-MS (inductively coupled plasma mass spectrometry)
- Helium leak detectors

Technical Features

- Dual Inlet (pumping down of two analysis chambers)
- Triple inlet (pumping down of three analysis chambers)
- High effective pumping speed

HV stage	up to 400 l/s
Interstage IS 1	up to 300 l/s
Interstage IS 2	up to 50 l/s

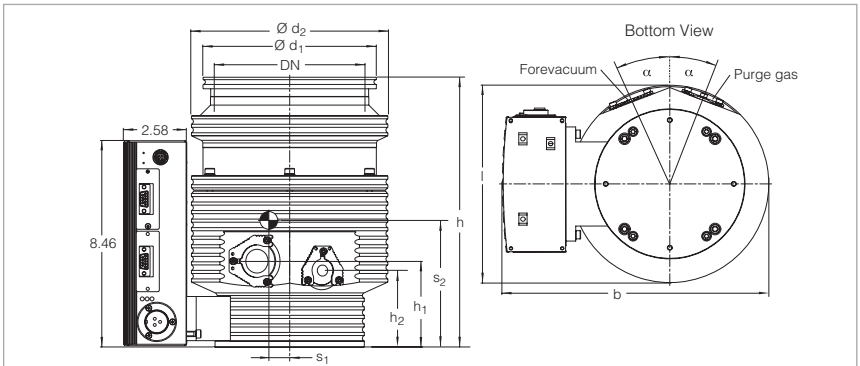
- Cartridge solutions (without pump housing) are available
- Compact vacuum system

Customized versions are available upon request

MAG INTEGRA – Magnetic Rotor Suspension with integrated Frequency Converter, with Compound Stage

TURBOVAC MAG W 300/400 iP

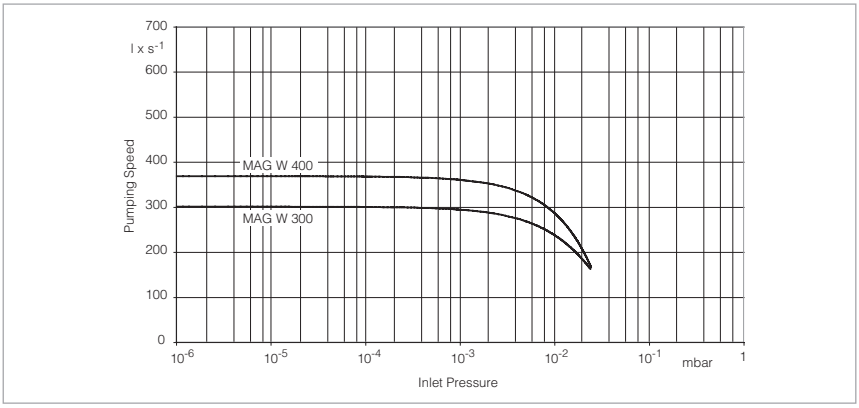




		DN	⌀ d_1	⌀ d_2	h	h_1	h_2	l	b	b*	α	s_1	s_2
MAG W 300 iP	mm	100 ISO-K	130.0	155.0	250.0	77.7	70.0	156.0	250.0	233.0	16°	19.0	103.0
	in.		5.12	6.10	9.84	3.06	2.76	6.14	9.84	9.17	16°	0.75	4.06
	mm	100 CF	151.5	155.0	264.3	77.7	70.0	156.0	250.0	233.0	16°	15.0	129.0
	in.		5.96	6.10	10.41	3.06	2.76	6.14	9.84	9.17	16°	0.59	5.08
MAG W 400 iP	mm	160 ISO-K	180.0	155.0	241.0	77.7	70.0	168.5	262.5	245.5	16°	19.0	106.0
	in.		7.09	6.10	9.49	3.06	2.76	6.63	10.33	9.67	16°	0.75	4.17
	mm	160 CF	202.5	155.0	234.7	77.7	70.0	181.2	273.7	256.7	16°	14.0	129.0
	in.		7.97	6.10	9.24	3.06	2.76	9.13	10.78	10.11	16°	0.55	5.08

b* = width with plug of the DRIVE/BEARING cable connected instead of MAG.DRIVE iS

Dimensional drawing for the TURBOVAC MAG W 300/400 iP



Pumping speed for N_2 of the TURBOVAC MAG W 300/400 iP as a function of the inlet pressure

Typical Applications

- Gas analysis systems
- Particle accelerators
- Electron microscopes
- Research
- Coating systems

Technical Features

- Installation in any orientation
- DN 100 or 160 ISO-K and/or CF high vacuum connection
- DN 16 ISO-KF with clamped fore vacuum connection
- Purge gas/venting connection DN 16 ISO-KF with clamped connection (purge/vent)
- Water or air cooling optional
- 2 slots for industrial communications modules
  - Standard 9 pin 24 V SPS PLC-IO in Control Slot
  - RS 232 C in Service Slot
  - further interfaces can be fitted: Profibus, RS 485 C, DeviceNet, EtherNet IP, EtherCat

Advantages to the User

- Highest pumping speed from the smallest possible size
- New standard regarding maintenance-free systems
- Suitability for vibration sensitive applications in the area of analytical engineering, thin-film technology, electron microscopes, research, development among others
- Flexibility due to the modular concept; the converter is optionally also available by way of a bench top unit

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data

TURBOVAC MAG

		W 300 iP		W 400 iP	
Inlet flange	DN	100 ISO-K	100 CF	160 ISO-K	160 CF
Pumping speed					
N_2	l/s	300	300	365	365
Ar	l/s	260	260	330	330
He	l/s	260	260	280	280
H_2	l/s	190	190	200	200
Operating speed	min^{-1}	58 800	58 800	58 800	58 800
Compression ratio					
N_2		1.0×10^{10}	1.0×10^{10}	1.0×10^{10}	1.0×10^{10}
H_2		3.2×10^{3}	3.2×10^{3}	3.2×10^{3}	3.2×10^{3}
He		9.2×10^{4}	9.2×10^{4}	9.2×10^{4}	9.2×10^{4}
Ultimate pressure	mbar (Torr)	$< 10^{-8}$ ($< 0.75 \times 10^{-8}$)	$< 10^{-10}$ ($< 0.75 \times 10^{-10}$)	$< 10^{-8}$ ($< 0.75 \times 10^{-8}$)	$< 10^{-10}$ ($< 0.75 \times 10^{-10}$)
Max. degassing temperature	°C (°F)	–	80 (176)	–	80 (176)
Max. foreline pressure for N_2	mbar (Torr)	8 (6)	8 (6)	8 (6)	8 (6)
Recommended backing pump		TRIVAC D 2,5 E TRIVAC D 8 B	TRIVAC D 2,5 E TRIVAC D 8 B	TRIVAC D 2,5 E TRIVAC D 8 B	TRIVAC D 2,5 E TRIVAC D 8 B
Run-up time	min	< 5	< 5	< 5	< 5
Foreline flange (clamped)	DN	16 ISO-KF	16 ISO-KF	16 ISO-KF	16 ISO-KF
Purge / vent port (clamped)	DN	16 ISO-KF	16 ISO-KF	16 ISO-KF	16 ISO-KF
Water cooling connection (optional)	G	1/8"	1/8"	1/8"	1/8"
Weight, approx.	kg (lbs)	12 (26)	12 (26)	12 (26)	12 (26)

Technical Data

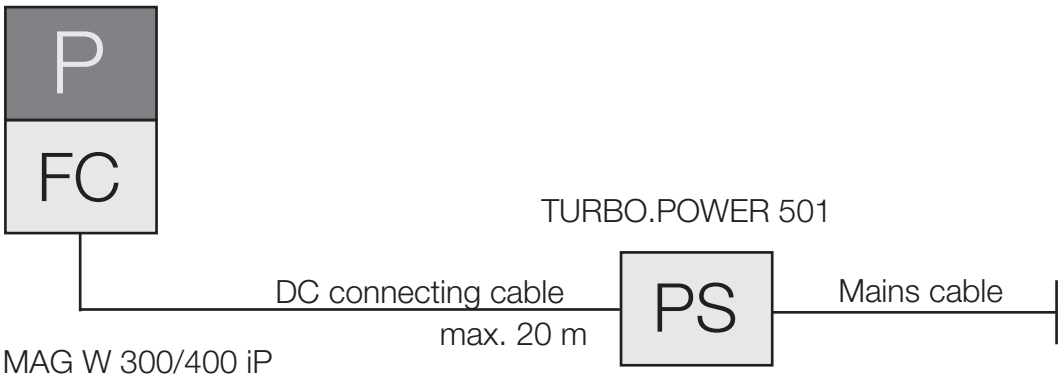
Integrated Frequency Converter TURBO.DRIVE iS

Power supply	V	48	48	48	48
Ripple	%	< 2	< 2	< 2	< 2
Power consumption					
maximum	W	400	400	400	400
at ultimate pressure	W	259	259	259	259
DC current consumption, max.	A	7.5 to 9.3	7.5 to 9.3	7.5 to 9.3	7.5 to 9.3
DC power supply voltage range	V	43 to 53	43 to 53	43 to 53	43 to 53
Length of the DC connection cable, max.					
at 3 x 1.5 mm^2	m (ft)	5 (17.5)	5 (17.5)	5 (17.5)	5 (17.5)
at 3 x 2.5 mm^2	m (ft)	20 (70.0)	20 (70.0)	20 (70.0)	20 (70.0)
Contact rating for the relays, max.		32 V; 0.5 A	32 V; 0.5 A	32 V; 0.5 A	32 V; 0.5 A
Permissible ambient temperature					
during operation	°C	+10 to +40	+10 to +40	+10 to +40	+10 to +40
	(°F)	(+50 to +104)	(+50 to +104)	(+50 to +104)	(+50 to +104)
during storage	°C	0 to +60	0 to +60	0 to +60	0 to +60
	(°F)	(0 to +140)	(0 to +140)	(0 to +140)	(0 to +140)
Relative humidity of the air, non-condensing	%	5 to 85	5 to 85	5 to 85	5 to 85
Protection class	IP	30	30	30	30
Overvoltage category		II	II	II	II
Pollution category		2	2	2	2

TURBOVAC MAG W 300 iP P FC with Integrated Frequency Converter and Seal Gas Connection	Part No.	
DN 100 ISO-K	410300V0505	
DN 100 CF	410300V0506	
TURBOVAC MAG W 400 iP P FC **with Integrated Frequency Converter and Seal Gas Connection**		
DN 160 ISO-K	410400V0505	
DN 160 CF	410400V0506	
Mandatory Accessories P FC		
Power supply TURBO.POWER 501	410300V5221	
DC cable frequency converter - power supply		
1 m (3.5 ft)	410300V2001	
3 m (10.5 ft)	410300V2003	
5 m (17.5 ft)	410300V2005	
10 m (35.0 ft)	410300V2010	
20 m (70.0 ft)	410300V2020	
Mains cable, 3 m (10.5 ft)	800102V0002	
with EURO plug	800102V1002	
with US plug 5-15 P		
Forevacuum pump		
TRIVAC D 2,5 E	140 000	
220 – 240 V, 50 Hz; 230 V, 60 Hz; Schuko plug, EURO version	140 002	
110 – 120 V, 50/60 Hz; NEMA plug, US version		
TRIVAC D 8 B	112 55	
1 phase motor; 230 V, 50/60 Hz	112 56	
3 phase motor; 230/400 V, 50 Hz; 250/440 V, 60 Hz		

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

With integrated Frequency Converter



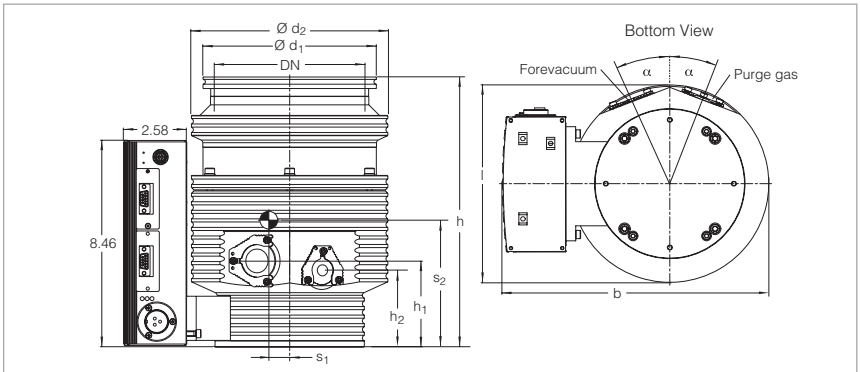
Ordering Information **TURBOVAC MAG W 300/400 iP**

Accessories, optional P	Part No.
Inlet screen	
DN 100 ISO-K	
coarse (3.2 x 3.2 mm (0.13 x 0.13 in.))	**800132V0101**
fine (1.6 x 1.6 mm (0.06 x 0.06 in.))	**800132V0102**
DN 100 CF	
coarse (3.2 x 3.2 mm (0.13 x 0.13 in.))	**200 91 514**
fine (1.6 x 1.6 mm (0.06 x 0.06 in.))	**E 200 17 195**
DN 160 ISO-K	**E 200 00 307**
DN 160 CF	**E 200 17 247**
Flange heater	
100 CF, 230 V, 50 Hz	**854 27**
100 CF, 115 V, 60 Hz	**854 28**
160 CF, 230 V, 50 Hz	**854 37**
160 CF, 115 V, 60 Hz	**854 38**
Water cooling unit	**410300V0101**
Air cooling unit	**410300V0102**
START/STOP switch for manual operation of the turbomolecular pump	**152 48**
DC plug	**800 001 694**
Solenoid venting valve, normally closed	
24 V DC, DN 16 ISO-KF	**800120V0011**
Power failure venting valve, normally open	**800120V0021**
Included in the Delivery of the Pump P	
Flanges for forevacuum, venting and purge gas are blank-flanged	
Centering ring with FPM sealing ring and a clamping yoke	

MAG INTEGRA – Magnetic Rotor Suspension with integrated Frequency Converter, with Compound Stage

TURBOVAC MAG W 600/700 iP

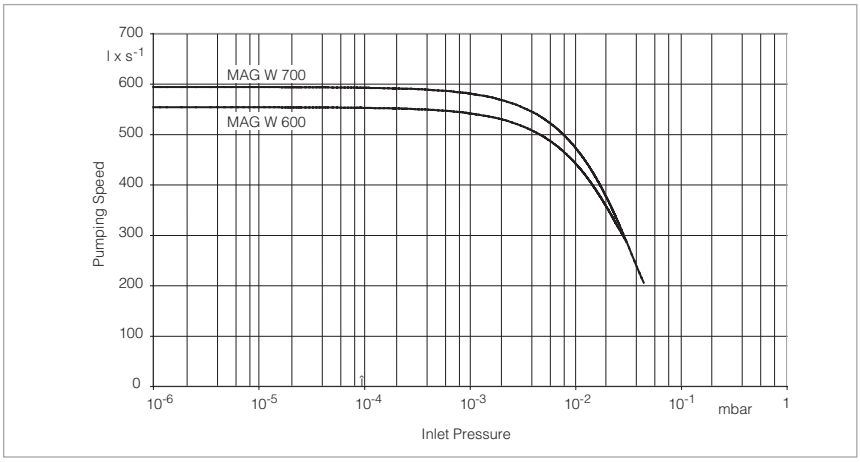




		DN	⌀ d_1	⌀ d_2	h	h_1	h_2	l	b	b*	α	s_1	s_2
MAG W 600 iP	mm	160 ISO-K	180.0	204.0	281.5	90	80	204.0	274.5	257.5	21°	13.0	121.0
	in.		7.09	8.03	11.08	3.54	3.15	8.03	10.81	10.14	21°	0.51	4.76
	mm	160 CF	202.5	204.0	294.0	90	80	204.0	274.5	257.5	21°	10.0	150.0
	in.		7.97	8.03	11.57	3.54	3.15	8.03	10.81	10.14	16°	0.39	5.91
MAG W 700 iP	mm	200 ISO-K	240.0	204.0	280.5	90	80	240.0	292.5	275.5	21°	13.0	130.0
	in.		9.45	8.03	11.04	3.54	3.15	9.45	11.52	10.85	21°	0.51	5.12
	mm	200 CF	253.0	204.0	275.0	90	80	253.0	299.0	282.0	21°	9.0	156.0
	in.		9.96	8.03	10.83	3.54	3.15	9.96	11.77	11.10	21°	0.35	6.14

b* = width with plug of the DRIVE/BEARING cable connected instead of MAG.DRIVE iS

Dimensional drawing for the TURBOVAC MAG W 600/700 iP



Pumping speed for N_2 of the TURBOVAC MAG W 600/700 iP as a function of the inlet pressure

Typical Applications

- Gas analysis systems
- Particle accelerators
- Electron microscopes
- Research
- Coating systems

Technical Features

- Installation in any orientation
- DN 160 or 200 ISO-K and/or CF high vacuum connection
- DN 25 ISO-KF with clamped fore-vacuum connection
- Purge gas/venting connection DN 16 ISO-KF with clamped connection (purge/vent)
- Water or air cooling optional
- 2 slots for industrial communications modules
  - Standard 9 pin 24 V SPS PLC-IO in Control Slot
  - RS 232 C in Service Slot
  - further interfaces can be fitted: Profibus, RS 485 C, DeviceNet, EtherNet IP, EtherCat

Advantages to the User

- Highest pumping speed from the smallest possible size
- New standard regarding maintenance-free systems
- Suitability for vibration sensitive applications in the area of analytical engineering, thin-film technology, electron microscopes, research, development among others
- Flexibility due to the modular concept; the converter is optionally also available by way of a bench top unit

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data

TURBOVAC MAG

		W 600 iP		W 700 iP	
Inlet flange	DN	160 ISO-K	160 CF	200 ISO-K	200 CF
Pumping speed					
N_2	l/s	550	550	590	590
Ar	l/s	520	520	540	540
He	l/s	570	570	600	600
H_2	l/s	410	410	430	430
Operating speed	min^{-1}	48 000	48 000	48 000	48 000
Compression ratio					
N_2		1.6×10^{10}	1.6×10^{10}	1.6×10^{10}	1.6×10^{10}
H_2		3.4×10^{4}	3.4×10^{4}	3.4×10^{4}	3.4×10^{4}
He		1.7×10^{6}	1.7×10^{6}	1.7×10^{6}	1.7×10^{6}
Ultimate pressure	mbar	$< 10^{-8}$	$< 10^{-10}$	$< 10^{-8}$	$< 10^{-10}$
	(Torr)	$(< 0.75 \times 10^{-8})$	$(< 0.75 \times 10^{-10})$	$(< 0.75 \times 10^{-8})$	$(< 0.75 \times 10^{-10})$
Max. degassing temperature	°C (°F)	–	80 (176)	–	80 (176)
Max. foreline pressure for N_2	mbar (Torr)	6.0 (4.5)	6.0 (4.5)	6.0 (4.5)	6.0 (4.5)
Recommended backing pump		TRIVAC D 2,5 E TRIVAC D 8 B	TRIVAC D 2,5 E TRIVAC D 8 B	TRIVAC D 2,5 E TRIVAC D 8 B	TRIVAC D 2,5 E TRIVAC D 8 B
Run-up time	min	< 6	< 6	< 6	< 6
Foreline flange (clamped)	DN	25 ISO-KF	25 ISO-KF	25 ISO-KF	25 ISO-KF
Purge / vent port (clamped)	DN	16 ISO-KF	16 ISO-KF	16 ISO-KF	16 ISO-KF
Water cooling connection (optional)	G	1/8"	1/8"	1/8"	1/8"
Weight, approx.	kg (lbs)	17 (37.5)	17 (37.5)	17 (37.5)	17 (37.5)

Technical Data

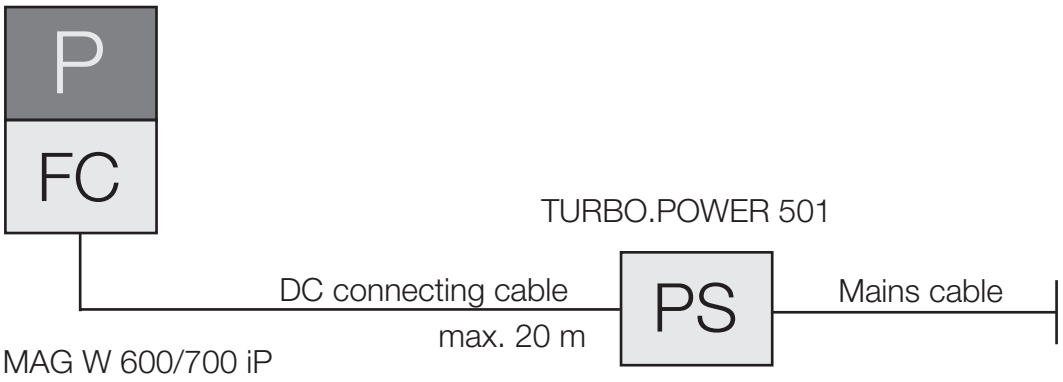
Integrated Frequency Converter TURBO.DRIVE iS

Power supply	V	48	48	48	48
Ripple	%	< 2	< 2	< 2	< 2
Power consumption					
maximum	W	400	400	400	400
at ultimate pressure	W	259	259	259	259
DC current consumption, max.	A	7.5 to 9.3	7.5 to 9.3	7.5 to 9.3	7.5 to 9.3
DC power supply voltage range	V	43 to 53	43 to 53	43 to 53	43 to 53
Length of the DC connection cable, max.					
at 3 x 1.5 mm^2	m (ft)	5 (17.5)	5 (17.5)	5 (17.5)	5 (17.5)
at 3 x 2.5 mm^2	m (ft)	20 (70.0)	20 (70.0)	20 (70.0)	20 (70.0)
Contact rating for the relays, max.		32 V; 0.5 A	32 V; 0.5 A	32 V; 0.5 A	32 V; 0.5 A
Permissible ambient temperature					
during operation	°C	+10 to +40	+10 to +40	+10 to +40	+10 to +40
	(°F)	(+50 to +104)	(+50 to +104)	(+50 to +104)	(+50 to +104)
during storage	°C	0 to +60	0 to +60	0 to +60	0 to +60
	(°F)	(0 to +140)	(0 to +140)	(0 to +140)	(0 to +140)
Relative humidity of the air, non-condensing	%	5 to 85	5 to 85	5 to 85	5 to 85
Protection class	IP	30	30	30	30
Overvoltage category		II	II	II	II
Pollution category		2	2	2	2

TURBOVAC MAG W 600 iP P FC with Integrated Frequency Converter and Seal Gas Connection	Part No.	
DN 160 ISO-K	410600V0505	
DN 160 CF	410600V0506	
TURBOVAC MAG W 700 iP P FC with Integrated Frequency Converter and Seal Gas Connection		
DN 200 ISO-K	410700V0505	
DN 200 CF	410700V0506	
Mandatory Accessories P FC		
Power supply TURBO.POWER 501	410300V5221	
DC cable frequency converter – power supply		
1 m (3.5 ft)	410300V2001	
3 m (10.5 ft)	410300V2003	
5 m (17.5 ft)	410300V2005	
10 m (35.0 ft)	410300V2010	
20 m (70.0 ft)	410300V2020	
Mains cable, 3 m (10.5 ft)		
with EURO plug	800102V0002	
with US plug 5-15 P	800102V1002	
Forevacuum pump		
TRIVAC D 2,5 E		
220 – 240 V, 50 Hz; 230 V, 60 Hz; Schuko plug, EURO version	140 000	
110 – 120 V, 50/60 Hz; NEMA plug, US version	140 002	
TRIVAC D 8 B		
1 phase motor; 230 V, 50/60 Hz	112 55	
3 phase motor; 230/400 V, 50 Hz; 250/440 V, 60 Hz	112 56	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

With integrated Frequency Converter



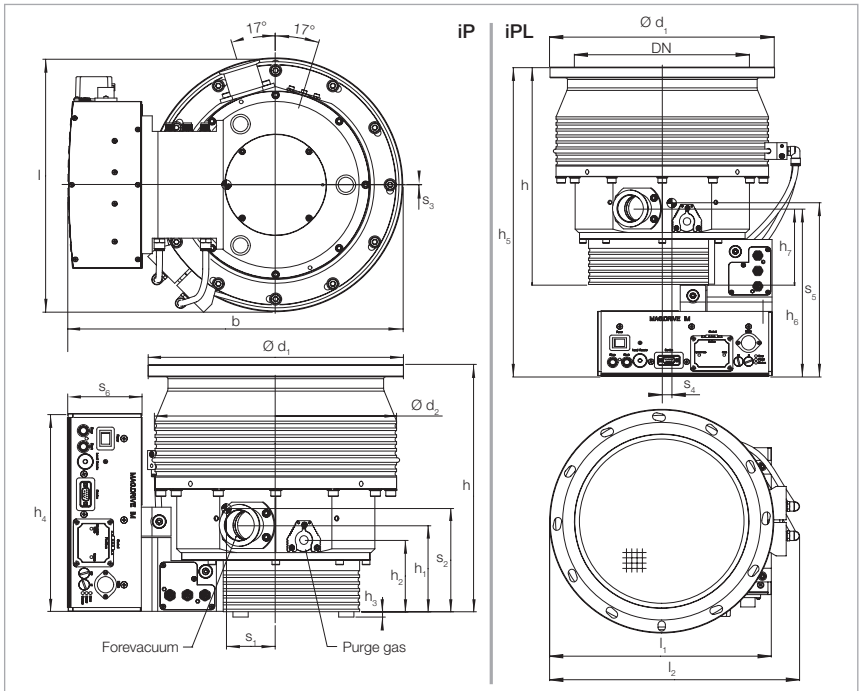
Ordering Information **TURBOVAC MAG W 600/700 iP**

Accessories, optional P	Part No.
Inlet screen	
DN 160 ISO-K	**E 200 00 307**
DN 160 CF	**E 200 17 247**
DN 200 ISO-K	**200 91 639**
DN 200 CF	**400 001 515**
Flange heater	
160 CF, 230 V, 50 Hz	**854 37**
160 CF, 115 V, 60 Hz	**854 38**
Water cooling unit	**410600V0101**
Air cooling unit	**410600V0102**
START/STOP switch for manual operation of the turbomolecular pump	**152 48**
DC plug	**800 001 694**
Solenoid venting valve, normally closed	
24 V DC, DN 16 ISO-KF	**800120V0011**
Power failure venting valve, normally open	**800120V0021**
Included in the Delivery of the Pump P	
Flanges for forevacuum, venting and purge gas are blank-flanged	
Centering ring with FPM sealing ring and a clamping yoke	

MAG INTEGRA – Magnetic Rotor Suspension with integrated Frequency Converter, with and without Compound Stage

TURBOVAC MAG W 1300 iP(L) to 2201 iP(L)





Type	DN		b	d_1	d_2	h	h_1	h_2	h_3	h_4	h_5	h_6
MAG W 1300	200 ISO-F	mm	420 [1]	285	285	305	114	94	7	260	442	251
		in.	16.54 [1]	11.22	11.22	12.01	4.49	3.70	0.38	10.24	17.40	9.88
	200 CF	mm	416	254	285	335	114	94	7	260	472	251
		in.	16.38	10.00	11.22	13.19	4.49	3.70	0.38	10.24	18.58	9.88
MAG W 1600/1601/1700	250 ISO-F	mm	442	335	317	325	114	94	7	260	463	251
		in.	17.40	13.19	12.48	12.80	4.49	3.70	0.38	10.24	18.23	9.88
	250 CF	mm	432	305	317	330	114	94	7	260	467	251
		in.	17.01	12.01	12.48	12.99	4.49	3.70	0.38	10.24	18.39	9.88
MAG W 2200/2201	250 ISO-F	mm	450	335	349	355	114	94	7	260	492	251
		in.	17.18	13.19	13.74	13.19	4.49	3.70	0.38	10.24	19.37	9.88
	250 CF	mm	446	305	349	372	114	94	7	260	506	251
		in.	17.56	12.01	13.74	14.65	4.49	3.70	0.38	10.24	19.92	9.88

			h_7	l	l_1	l_2	s_1	s_2	s_3	s_4	s_5	s_6
MAG W 1300	200 ISO-F	mm	114	311 [1]	311 [1]	332 [1]	42	140	0	15	241	98
		in.	4.49	12.24 [1]	12.24 [1]	13.07 [1]	1.65	5.51	0	0.59	9.49	3.86
	200 CF	mm	114	307	307	–	32	164	0	–	–	98
		in.	4.49	12.09	12.09	–	1.26	6.46	0	–	–	3.86
MAG W 1600/1601/1700	250 ISO-F	mm	114	335	331	374	39	154	0	14	259	98
		in.	4.49	13.19	12.24	14.72	1.54	6.06	0	0.55	10.20	3.86
	250 CF	mm	114	335	322	–	29	173	0	9	285	98
		in.	4.49	13.19	12.68	–	1.14	6.81	0	0.35	11.22	3.86
MAG W 2200/2201	250 ISO-F	mm	114	343	340	392	34	165	0	12	272	98
		in.	4.49	13.50	13.39	15.43	1.34	6.50	0	0.47	10.71	3.86
	250 CF	mm	114	339	340	–	26	187	0	8	302	98
		in.	4.49	13.35	13.39	–	1.02	7.36	0	0.32	11.89	3.86

[1] 4 mm (0.16 in.) for cooling coil

Dimensional drawing for the MAG INTEGRA, dimensions in mm

Typical Applications

- PVD coatings systems
- Coating of architectural glass
- Optical coatings
- LC displays
- Flat panels
- Research
- Analytical systems

Technical Features

- Installation in any orientation
- DN 200 and/or 250 in ISO-F and/or CF high vacuum connection
- DN 40 KF forevacuum connection
- Purge gas/venting connection DN 16 KF with clamped connection (purge/vent)
- Water cooling
- Protection class IP 54
- RS 232 C in Service Slot
- 1 slot for industrial communications modules
  - Standard ProfiBus
  - further interfaces can be fitted: RS 485 C, 9 pin 24 V PLC, DeviceNet, EtherNet IP, EtherCat

Advantages to the User

- Highest pumping speed and gas throughput from a very small size
- Rugged and reliable operation in industrial applications
- Sets new benchmarks for maintenance-free systems
- Suited for vibration sensitive applications in the areas of analytical, thin-film, electron microscopy, research and development among others.
- Flexibility through the modular concept; the converter is either attached to the side or under the pump

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data

TURBOVAC MAG W

		1300 iP(L)	1600 iP(L) Booster	1601 iP(L) Booster	1700 iP(L)	2200 iP(L)	2201 iP(L)
Inlet flange	DN	200 ISO-F 200 CF	250 ISO-F	250 ISO-F	250 ISO-F 250 CF	250 ISO-F 250 CF	250 ISO-F
Pumping speed							
N_2	l/s	1100	1600	1600	1610	2100	2100
Ar	l/s	1050	1470	1470	1480	1900	1900
He	l/s	1220	1770	1770	1710	2050	2050
H_2	l/s	1130	1570	1570	1500	1750	1750
Operating speed							
standby speed adjustable from	min^{-1}	37 800	33 000	33 000	33 000	30 600	30 000
to nominal speed	min^{-1}	13 800 (230 Hz)	13 800 (230 Hz)	13 800 (230 Hz)	13 800 (230 Hz)	13 800 (230 Hz)	13 800 (230 Hz)
Max. compression ratiop							
N_2		> 10^8	> 10^7	> 10^7	> 10^8	> 10^8	> 10^8
Ar		> 10^8	> 10^7	> 10^7	> 10^8	> 10^8	> 10^8
He at 1 sccm		2 x 10^5	6 x 10^4	3 x 10^3	2 x 10^5	5 x 10^4	5 x 10^3
H_2 at 1 sccm		8 x 10^3	1 x 10^3	5 x 10^2	4 x 10^3	5 x 10^3	5 x 10^2
Max. gas throughput							
N_2 briefly, e.g. during pumpdown	mbar x l/s	30	60	60	30	30	50
N_2 in continuous operation	mbar x l/s	20	30	40	20	17	36
Ar briefly, e.g. during pumpdown	mbar x l/s	20	30	30	20	20	30
Ar in continuous operation	mbar x l/s	15	20	25	15	12	24
Ultimate pressure							
ISO-F flange	mbar (Torr)	< 10^{-8} (< 7.5 x 10^{-9})	< 10^{-8} (< 7.5 x 10^{-9})	< 10^{-8} (< 7.5 x 10^{-9})	< 10^{-8}	< 10^{-8}	< 10^{-8} (< 7.5 x 10^{-9})
CF flange	mbar (Torr)	< 10^{-10} (< 7.5 x 10^{-11})	–	–	< 10^{-10} (< 7.5 x 10^{-11})	< 10^{-10} (< 7.5 x 10^{-11})	–
Max. degassing temperature	°C (°F)	80 (176)					
Max. foreline pressure							
N_2	mbar (Torr)	4.0 (3.00)	1.0 (0.75)	1.0 (0.75)	4.0 (3.00)	2.5 (1.9)	1.2 (0.91)
Ar	mbar (Torr)	0.6 (0.45)	1.0 (0.75)	1.0 (0.75)	0.6 (0.45)	2.5 (1.9)	1.2 (0.91)
Recommended backing pump		TRIVAC B or dry compressing pumps					
Run-up time	min	< 5	< 7	< 7	< 7	< 10	< 10
Foreline flange	DN	40 KF					
Purge / vent port (clamped)	DN	16 KF					
Water cooling connection	G	1/8“					
Weight, approx.	kg (lbs)	40 (88)	45 (99)	45 (99)	45 (99)	50 (110)	50 (110)
Noise level acc. ISO 3744	dB(A	< 41					
Vibration level at high vacuum flange at max. speed	µm	0.01					

Technical Data

Integrated Frequency Converter

MAG.DRIVE iM

Power supply	V	200 – 240 ±10%
Mains frequency	Hz	50 / 60
Power consumption		
maximum	W	750
at ultimate pressure	W	150
Contact rating for the relays, max.		32 V, 0.5 A
Permissible ambient temperature		
during operation	°C (°F)	+10 to +45 (+50 to +113)
during storage	°C (°F)	-10 to +60 (+14 to +140)
Relative humidity of the air, non-condensing	%	5 to 85
Protection class	IP	54
Overvoltage category		II
Pollution category		2

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Ordering Information

TURBOVAC MAG W1300/1600/1601/ 1700/2200/2201 iP(L)

TURBOVAC MAG W 1300 with Integrated Frequency Converter and Purge Gas Connection (P FC PS)	Part No.
MAG W 1300 iP, DN 200 ISO-F, Profibus	411300V0504
MAG W 1300 iP, DN 200 ISO-F, 24 V SPS interface	411300V0514
MAG W 1300 iP, DN 200 CF, Profibus	411300V0506
MAG W 1300 iP, DN 200 CF, 24 V SPS interface	411300V0516
MAG W 1300 iPL, DN 200 ISO-F, Profibus	411300V0704
MAG W 1300 iPL, DN 200 ISO-F, 24 V SPS interface	411300V0714
MAG W 1300 iPL, DN 200 CF, Profibus	411300V0706
MAG W 1300 iPL, DN 200 CF 24 V SPS interface	411300V0716
TURBOVAC MAG W 1600 Booster with Integrated Frequency Converter and Purge Gas Connection (P FC PS)	**Part No.**
MAG W 1600 iP Booster, DN 250 ISO-F, Profibus	411600V0504
MAG W 1600 iP Booster, DN 250 ISO-F, 24 V SPS interface	411600V0514
MAG W 1600 iPL Booster, DN 250 ISO-F, Profibus	411600V0704
MAG W 1600 iPL Booster, DN 250 ISO-F, 24 V SPS interface	411600V0714
TURBOVAC MAG 1601 Booster with Integrated Frequency Converter and Purge Gas Connection (P FC PS)	**Part No.**
MAG 1601 iP Booster, DN 250 ISO-F, Profibus	411600V2504
MAG 1601 iP Booster, DN 250 ISO-F, 24 V SPS interface	411600V2514
MAG 1601 iPL Booster, DN 250 ISO-F, Profibus	411600V2704
MAG 1601 iPL Booster, DN 250 ISO-F, 24 V SPS interface	411600V2714
TURBOVAC MAG W 1700 with Integrated Frequency Converter and Purge Gas Connection (P FC PS)	**Part No.**
MAG W 1700 iP, DN 250 ISO-F, Profibus	411700V0504
MAG W 1700 iP, DN 250 ISO-F, 24 V SPS interface	411700V0514
MAG W 1700 iP, DN 250 CF, Profibus	411700V0506
MAG W 1700 iP, DN 250 CF, 24 V SPS interface	411700V0516
MAG W 1700 iPL, DN 250 ISO-F, Profibus	411700V0704
MAG W 1700 iPL, DN 250 ISO-F, 24 V SPS interface	411700V0714
MAG W 1700 iPL, DN 250 CF, Profibus	411700V0706
MAG W 1700 iPL, DN 250 CF, 24 V SPS interface	411700V0716
TURBOVAC MAG W 2200 with Integrated Frequency Converter and Purge Gas Connection (P FC PS)	**Part No.**
MAG W 2200 iP, DN 250 ISO-F, Profibus	412200V0504
MAG W 2200 iP, DN 250 ISO-F, 24 V SPS interface	412200V0514
MAG W 2200 iP, DN 250 CF, Profibus	412200V0506
MAG W 2200 iP, DN 250 CF, 24 V SPS interface	412200V0516
MAG W 2200 iPL, DN 250 ISO-F, Profibus	412200V0704
MAG W 2200 iPL, DN 250 ISO-F, 24 V SPS interface	412200V0714
MAG W 2200 iPL, DN 250 CF, Profibus	412200V0706
MAG W 2200 iPL, DN 250 CF, 24 V SPS interface	412200V0716
TURBOVAC MAG 2201 Booster with Integrated Frequency Converter and Purge Gas Connection (P FC PS)	**Part No.**
MAG 2201 iP, DN 250 ISO-F, Profibus	412200V2504
MAG 2201 iP, DN 250 ISO-F, 24 V SPS interface	412200V2514
MAG 2201 iPL, DN 250 ISO-F, Profibus	412200V2704
MAG 2201 iPL, DN 250 ISO-F, 24 V SPS interface	412200V2714



Other interfaces upon request

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

With integrated Frequency Converter and Power Supply



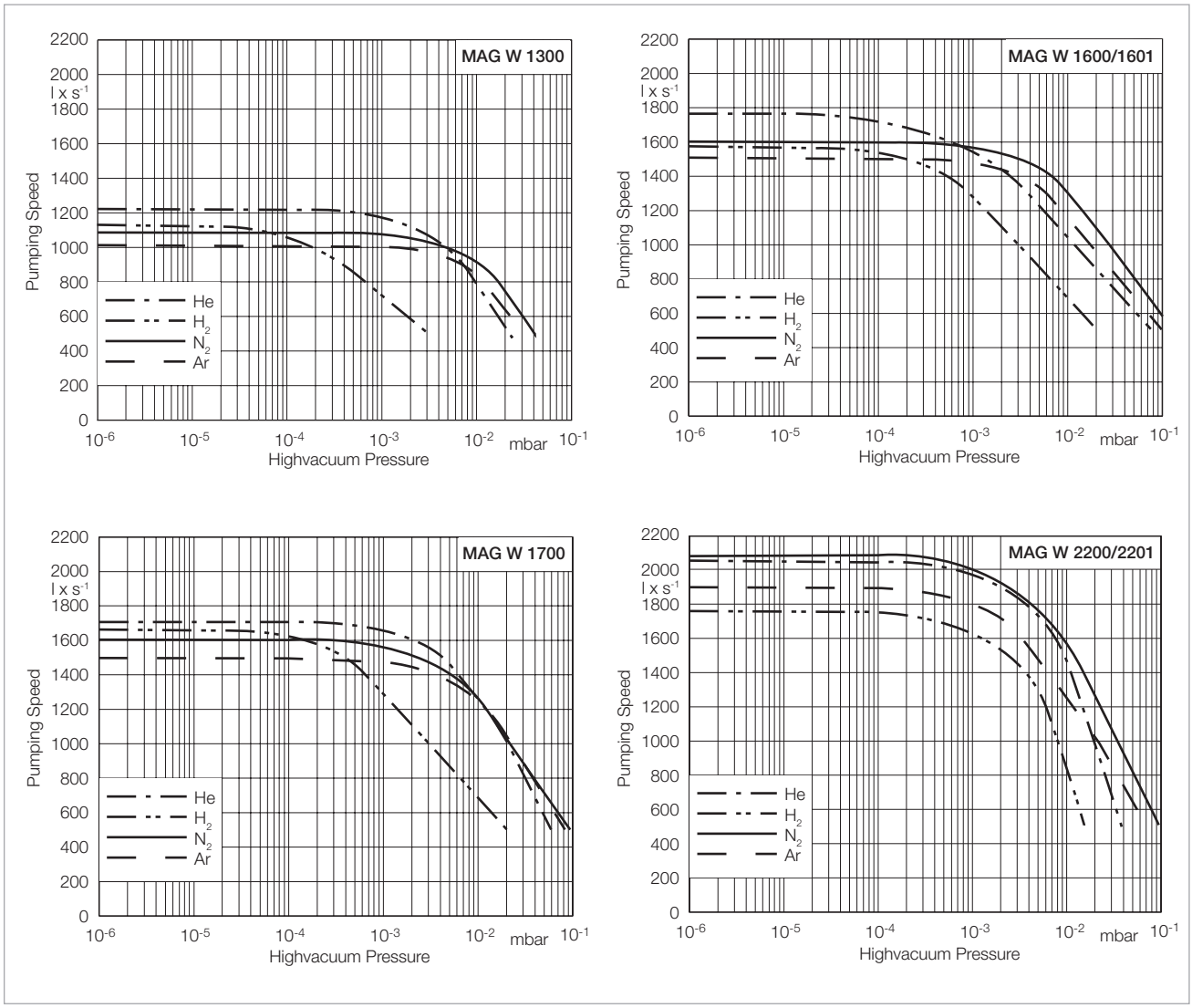
MAG W 1300 iP(L),
MAG W 1600/1601 iP(L) Booster,
MAG W 1700 iP(L),
MAG W 2200/2201 iP(L)

Ordering Information

TURBOVAC MAG W1300/1600/1601/ 1700/2200/2201 iP(L)

Mandatory Accessories P	Part No.
Set of bolts, nuts and washers for ISO-F flange (12 each)	
Bolts M 10 x 50	400153V0012
Bolts M 10 x 35	400153V0010
Centering with O-ring	
Al/FPM	
DN 200	268 44
DN 250	268 45
Stainless steel/FPM	
DN 200	887 02
DN 250	887 08
Set of bolts, nuts and washers for CF flange (8 each)	
Bolts M 8 x 40	400153V0016
(For DN 200, 3 sets are required; for DN 250, 4 sets)	
Copper gasket rings for CF flange	
DN 200 (Set of 10 pieces)	839 47
DN 250 (Set of 5 pieces)	839 48
Set of hex. bolts with nuts, bolts and washers for CF flange	
DN 200	839 07
DN 250 (2 sets required)	839 07
Accessories, optional P FC PS	
Mains cable, 2.5 m (8.75 ft)	
with EURO plug	411310V03
with US plug	411320V03
Seal Kit DN 250 Metal	200 07 901
Seal kit, metal, for other flanges	upon request
Purge gas and venting valve 24 V DC	
0.6 mbar·l/s at 1.5 to 6 bar	121 33
0.6 mbar·l/s at 1 to 1.5 bar	800152V0010
Cable set (2 pieces) for connection to the pump	411300V01
Cooling water valve kit	411300V02
Spare Parts	
Inlet screen	
DN 200 ISO-F and DN 200 CF	E 200 04 558
DN 250 ISO-F and DN 250 CF	E 200 04 557
Included in the Delivery of the Pump P	
Flanges for forevacuum, venting and purge gas are blank-flanged	
Converter-side mains plug (IP 54)	
Inlet screen	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



Pumping speed curves of the MAG W 1300, W 1600, W 1700 and W 2200

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

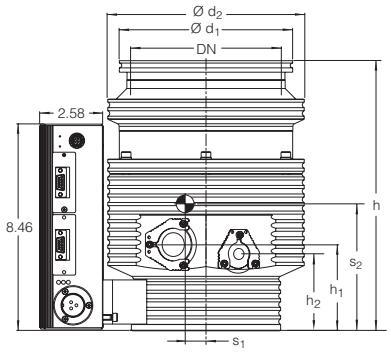
Notes

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

MAG INTEGRA – Magnetic Rotor Suspension with separate Frequency Converter, with Compound Stage

TURBOVAC MAG W 300/400 P

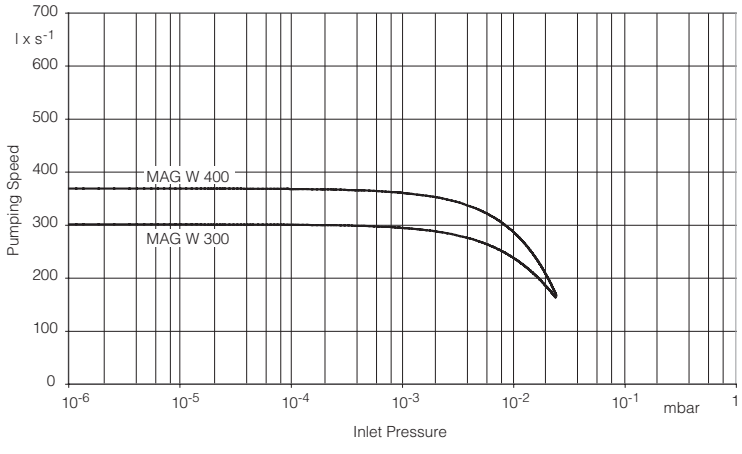




	DN		Ø d_1	Ø d_2	h	h_1	h_2	l	b	b*	α	s_1	s_2
MAG W 300 P	100 ISO-K	mm	130.0	155.0	250.0	77.7	70.0	156.0	250.0	233.0	16°	19.0	103.0
		in.	5.12	6.10	9.84	3.06	2.76	6.14	9.84	9.17	16°	0.75	4.06
	100 CF	mm	151.5	155.0	264.3	77.7	70.0	156.0	250.0	233.0	16°	15.0	129.0
		in.	5.97	6.10	10.41	3.06	2.76	6.14	9.84	9.17	16°	0.59	5.08
MAG W 400 P	160 ISO-K	mm	180.0	155.0	241.0	77.7	70.0	168.5	262.5	245.5	16°	19.0	106.0
		in.	7.09	6.10	9.49	3.06	2.76	6.63	10.34	9.67	16°	0.75	4.17
	160 CF	mm	202.5	155.0	234.7	77.7	70.0	181.2	273.7	256.7	16°	14.0	129.0
		in.	7.97	6.10	9.24	3.06	2.76	7.13	10.78	10.11	16°	0.55	5.08

b* = width with plug of the DRIVE/BEARING cable connected instead of MAG.DRIVE iS

Dimensional drawing for the TURBOVAC MAG W 300/400 P



Pumping speed for N_2 of the TURBOVAC MAG W 300/400 P as a function of the inlet pressure

Typical Applications

- Gas analysis systems
- Particle accelerators
- Electron microscopes
- Research
- Coating systems

Technical Features

- Installation in any orientation
- DN 100 or 160 ISO-K and/or CF high vacuum connection
- DN 16 ISO-KF with clamped forevacuum connection
- Purge gas/venting connection DN 16 ISO-KF with clamped connection (purge/vent)
- Water or air cooling optional

Advantages to the User

- Highest pumping speed from the smallest possible size
- New standard regarding maintenance-free systems
- Suitability for vibration sensitive applications in the area of analytical engineering, thin-film technology, electron microscopes, research, development among others
- Flexibility due to the modular concept; alternatively the pump is available also with an integrated frequency converter

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data

TURBOVAC MAG

		W 300 P		W 400 P	
Inlet flange	DN	100 ISO-K	100 CF	160 ISO-K	160 CF
Pumping speed					
N_2	l/s	300	300	365	365
Ar	l/s	260	260	330	330
He	l/s	260	260	280	280
H_2	l/s	190	190	200	200
Operating speed	min^{-1}	58 800	58 800	58 800	58 800
Compression ratio					
N_2		1.0×10^{10}	1.0×10^{10}	1.0×10^{10}	1.0×10^{10}
H_2		3.2×10^{3}	3.2×10^{3}	3.2×10^{3}	3.2×10^{3}
He		9.2×10^{4}	9.2×10^{4}	9.2×10^{4}	9.2×10^{4}
Ultimate pressure	mbar	$< 10^{-8}$	$< 10^{-10}$	$< 10^{-8}$	$< 10^{-10}$
	(Torr)	$(< 0.75 \times 10^{-8})$	$(< 0.75 \times 10^{-10})$	$(< 0.75 \times 10^{-8})$	$(< 0.75 \times 10^{-10})$
Max. degassing temperature	°C (°F)	–	80 (176)	–	80 (176)
Max. foreline pressure for N_2	mbar (Torr)	8 (6)	8 (6)	8 (6)	8 (6)
Recommended backing pump		TRIVAC D 2,5 E TRIVAC D 8 B	TRIVAC D 2,5 E TRIVAC D 8 B	TRIVAC D 2,5 E TRIVAC D 8 B	TRIVAC D 2,5 E TRIVAC D 8 B
Run-up time	min	< 5	< 5	< 5	< 5
Foreline flange (clamped)	DN	16 ISO-KF	16 ISO-KF	16 ISO-KF	16 ISO-KF
Purge / vent port (clamped)	DN	16 ISO-KF	16 ISO-KF	16 ISO-KF	16 ISO-KF
Water cooling connection (optional)	G	1/8"	1/8"	1/8"	1/8"
Weight, approx.	kg (lbs)	12 (26)	12 (26)	12 (26)	12 (26)

Technical Data

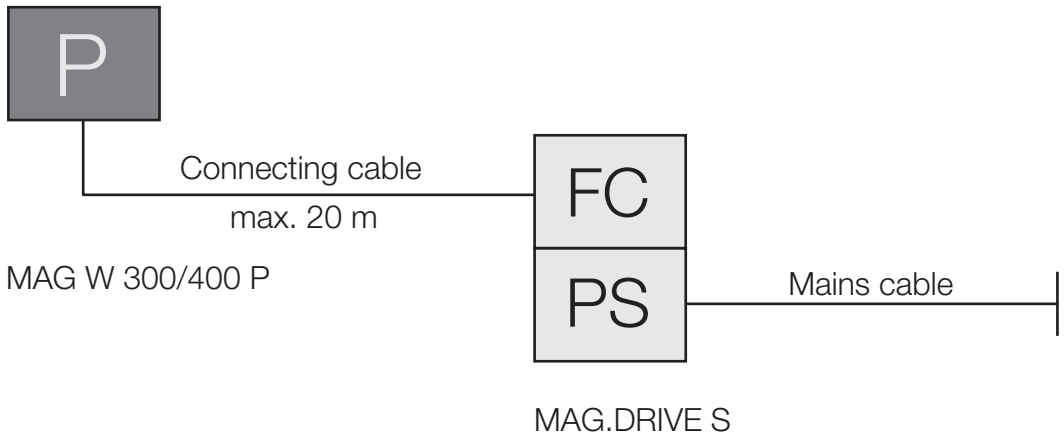
MAG.DRIVE S

Voltage range	V	100 – 240, ±10 %
Nominal frequency	Hz	50 / 60
Power consumption		
stand-by	W	100
maximum	W	400
Max. motor voltage	V	48
Max. pump current	A	6
Fuses F1, F2 5 x 20 mm		10 A fast blow high breaking capacity 250 V
System fuse		L or G characteristic
Max. frequency	Hz	0 to 2000
Load capability, relay output X1	V / A	32 / 0,5
Temperature		
during operation	°C (°F)	0 to +45 (+32 to +113)
during storage	°C (°F)	-10 to +60 (+14 to +140)
Relative humidity of the air	%	95 (non-condensing)

TURBOVAC MAG W 300 P [P] **with separate Frequency Converter and Compound Stage**	**Part No.**	
DN 100 ISO-K	**410300V0005**	
DN 100 CF	**410300V0006**	
TURBOVAC MAG W 400 P [P] **with separate Frequency Converter and Compound Stage**		
DN 160 ISO-K	**410400V0005**	
DN 160 CF	**410400V0006**	
Mandatory Accessories [P] [FC]		
Electronic frequency converter		
MAG.DRIVE S with display	**410300V0212**	
Connecting cable DRIVE/BEARING		
(connection between pump and MAG.DRIVE S)		
3.0 m (10.5 ft)	**410300V4003**	
5.0 m (17.5 ft)	**410300V4005**	
10.0 m (35.0 ft)	**410300V4010**	
20.0 m (70.0 ft)	**410300V4020**	
Mains cable		
3.0 m (10.5 ft)		
EURO plug	**800102V0002**	
US plug 5-15 P	**800102V1002**	
2.0 m (7.5 ft)		
US plug 115 V AC	**992 76 513**	
Forevacuum pump		
TRIVAC D 2,5 E		
220 – 240 V, 50 Hz; 230 V, 60 Hz; Schuko plug, EURO version	**140 000**	
110 – 120 V, 50/60 Hz; NEMA plug, US version	**140 002**	
TRIVAC D 8 B		
1 phase motor; 230 V, 50/60 Hz	**112 55**	
3 phase motor; 230/400 V, 50 Hz; 250/440 V, 60 Hz	**112 56**	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

With separate Frequency Converter



Ordering Information **TURBOVAC MAG W 300/400 P**

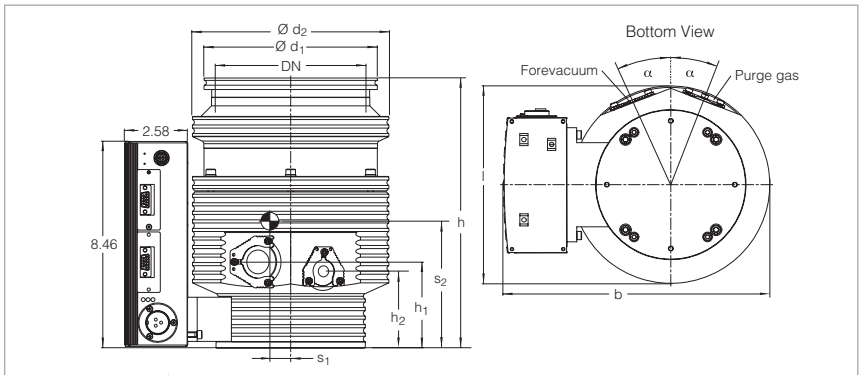
Accessories, optional P	Part No.
Inlet screen	
DN 100 ISO-K	
coarse (3.2 x 3.2 mm (0.13 x 0.13 in.)	800132V0101
fine (1.6 x 1.6 mm (0.06 x 0.06 in.))	800132V0102
DN 100 CF	
coarse (3.2 x 3.2 mm (0.13 x 0.13 in.))	200 91 514
fine (1.6 x 1.6 mm (0.06 x 0.06 in.))	E 200 17 195
DN 160 ISO-K	E 200 00 307
DN 160 CF	E 200 17 247
Flange heater	
100 CF, 230 V, 50 Hz	854 27
100 CF, 115 V, 60 Hz	854 28
160 CF, 230 V, 50 Hz	854 37
160 CF, 115 V, 60 Hz	854 38
Water cooling unit	410300V0101
Air cooling unit	410300V0102
Solenoid venting valve, normally closed	
24 V DC, DN 16 ISO-KF	800120V0011
Power failure venting valve, normally open	800120V0021
Included in the Delivery of the Pump P	
Flanges for forevacuum, venting and purge gas are blank-flanged	
Centering ring with FPM sealing ring and a clamping yoke	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

MAG INTEGRA – Magnetic Rotor Suspension with separate Frequency Converter, with Compound Stage

TURBOVAC MAG W 600/700 P

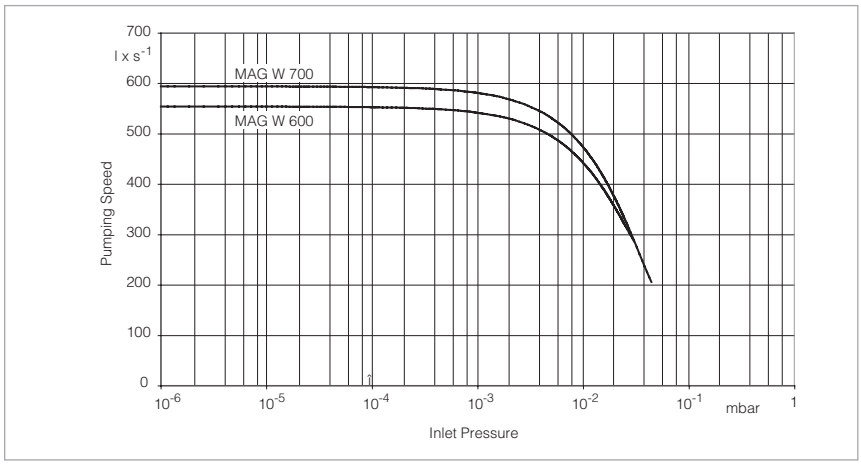




		DN	ø d_1	ø d_2	h	h_1	h_2	l	b	b*	α	s_1	s_2
MAG W 600 P	mm	160 ISO-K	180.0	204.0	281.5	90	80	204.0	274.5	257.5	21°	13.0	121.0
	in.		7.09	8.03	11.08	3.54	3.15	8.03	10.81	10.14	21°	0.51	4.76
	mm	160 CF	202.5	204.0	294.0	90	80	204.0	274.5	257.5	21°	10.0	150.0
	in.		7.97	8.03	11.57	3.54	3.15	8.03	10.81	10.14	21°	0.39	5.91
MAG W 700 P	mm	200 ISO-K	240.0	204.0	280.5	90	80	240.0	292.5	275.5	21°	13.0	130.0
	in.		9.45	8.03	11.04	3.54	3.15	9.45	11.52	10.85	21°	0.51	5.12
	mm	200 CF	253.0	204.0	275.0	90	80	253.0	299.0	282.0	21°	9.0	156.0
	in.		9.96	8.03	10.83	3.54	3.15	9.96	11.77	11.10	21°	0.35	6.14

b* = width with plug of the DRIVE/BEARING cable connected instead of MAG.DRIVE iS

Dimensional drawing for the TURBOVAC MAG W 600/700 P



Pumping speed for N_2 of the TURBOVAC MAG W 600/700 P as a function of the inlet pressure

Typical Applications

- Gas analysis systems
- Particle accelerators
- Electron microscopes
- Research
- Coating systems

Technical Features

- Installation in any orientation
- DN 160 or 200 ISO-K and/or CF high vacuum connection
- DN 25 ISO-KF with clamped forevacuum connection
- Purge gas/venting connection DN 16 ISO-KF with clamped connection (purge/vent)
- Water or air cooling optional

Advantages to the User

- Highest pumping speed from the smallest possible size
- New standard regarding maintenance-free systems
- Suitability for vibration sensitive applications in the area of analytical engineering, thin-film technology, electron microscopes, research, development among others
- Flexibility due to the modular concept; alternatively the pump is available also with an integrated frequency converter

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data

TURBOVAC MAG

		W 600 P		W 700 P	
Inlet flange	DN	160 ISO-K	160 CF	200 ISO-K	200 CF
Pumping speed					
N_2	l/s	550	550	590	590
Ar	l/s	520	520	540	540
He	l/s	570	570	600	600
H_2	l/s	410	410	430	430
Operating speed	min^{-1}	48 000	48 000	48 000	48 000
Compression ratio					
N_2		1.6×10^{10}	1.6×10^{10}	1.6×10^{10}	1.6×10^{10}
H_2		3.4×10^{4}	3.4×10^{4}	3.4×10^{4}	3.4×10^{4}
He		1.7×10^{6}	1.7×10^{6}	1.7×10^{6}	1.7×10^{6}
Ultimate pressure	mbar	$< 10^{-8}$	$< 10^{-10}$	$< 10^{-8}$	$< 10^{-10}$
	(Torr)	($< 0.75 \times 10^{-8}$)	($< 0.75 \times 10^{-10}$)	($< 0.75 \times 10^{-8}$)	($< 0.75 \times 10^{-10}$)
Max. degassing temperature	°C (°F)	–	80 (176)	–	80 (176)
Max. foreline pressure for N_2	mbar (Torr)	6.0 (4.5)	6.0 (4.5)	6.0 (4.5)	6.0 (4.5)
Recommended backing pump		TRIVAC D 2,5 E TRIVAC D 8 B	TRIVAC D 2,5 E TRIVAC D 8 B	TRIVAC D 2,5 E TRIVAC D 8 B	TRIVAC D 2,5 E TRIVAC D 8 B
Run-up time	min	< 6	< 6	< 6	< 6
Foreline flange (clamped)	DN	25 ISO-KF	25 ISO-KF	25 ISO-KF	25 ISO-KF
Purge / vent port (clamped)	DN	16 ISO-KF	16 ISO-KF	16 ISO-KF	16 ISO-KF
Water cooling connection (optional)	G	1/8"	1/8"	1/8"	1/8"
Weight, approx.	kg (lbs)	17 (37.5)	17 (37.5)	17 (37.5)	17 (37.5)

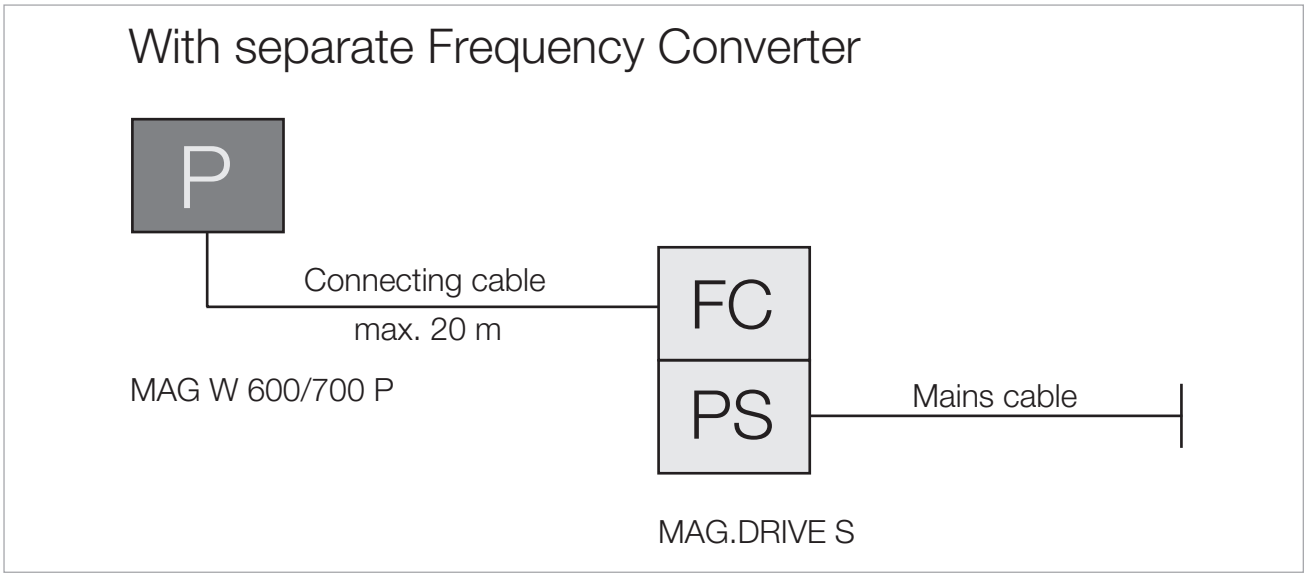
Technical Data

MAG.DRIVE S

Voltage range	V	100 – 240, ±10 %
Nominal frequency	Hz	50 / 60
Power consumption		
stand-by	W	100
maximum	W	400
Max. motor voltage	V	48
Max. pump current	A	6
Fuses F1, F2 5 x 20 mm		10 A fast blow high breaking capacity 250 V
System fuse		L or G characteristic
Max. frequency	Hz	0 to 2000
Load capability, relay output X1	V / A	32 / 0.5
Temperature		
during operation	°C (°F)	0 to +45 (+32 to +113)
during storage	°C (°F)	-10 to +60 (+14 to +140)
Relative humidity of the air	%	95 (non-condensing)

TURBOVAC MAG W 600 P with separate Frequency Converter and Compound Stage P	Part No.	
DN 160 ISO-K	410600V0005	
DN 160 CF	410600V0006	
TURBOVAC MAG W 700 P with separate Frequency Converter and Compound Stage P		
DN 200 ISO-K	410700V0005	
DN 200 CF	410700V0006	
Mandatory Accessories P FC		
Electronic frequency converter MAG.DRIVE S with display	410300V0212	
Connecting cable DRIVE/BEARING (connection between pump and MAG.DRIVE S)		
3.0 m (10.5 ft)	410300V4003	
5.0 m (17.5 ft)	410300V4005	
10.0 m (35.0 ft)	410300V4010	
20.0 m (70.0 ft)	410300V4020	
Mains cable		
3.0 m (10.5 ft)		
EURO plug	800102V0002	
US plug 5-15 P	800102V1002	
2.0 m (7.5 ft)		
US plug 115 V AC	992 76 513	
Forevacuum pump		
TRIVAC D 2,5 E		
220 – 240 V, 50 Hz; 230 V, 60 Hz; Schuko plug, EURO version	140 000	
110 – 120 V, 50/60 Hz; NEMA plug, US version	140 002	
TRIVAC D 8 B		
1 phase motor; 230 V, 50/60 Hz	112 55	
3 phase motor; 230/400 V, 50 Hz; 250/440 V, 60 Hz	112 56	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



Ordering Information

TURBOVAC MAG W 600/700 P

Accessories, optional	P	Part No.
Inlet screen		
DN 160 ISO-K		**E 200 00 307**
DN 160 CF		**E 200 17 247**
DN 200 ISO-K		**200 91 639**
DN 200 CF		**400 001 515**
Flange heater		
160 CF, 230 V, 50 Hz		**854 37**
160 CF, 115 V, 60 Hz		**854 38**
Water cooling unit		**410600V0101**
Air cooling unit		**410600V0102**
Solenoid venting valve, normally closed		
24 V DC, DN 16 ISO-KF		**800120V0011**
Power failure venting valve, normally open		**800120V0021**
Included in the Delivery of the Pump	P	
Flanges for forevacuum, venting and purge gas are blank-flanged		
Centering ring with FPM sealing ring and a clamping yoke		

Accessories

Electronic Frequency Converters for Pumps with Magnetic Rotor Suspension

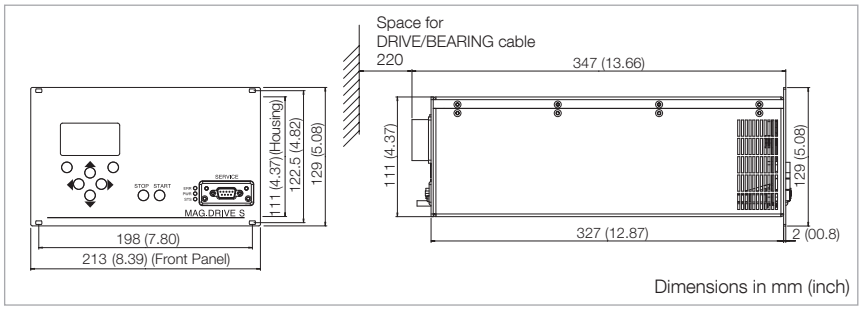
MAG.DRIVE S



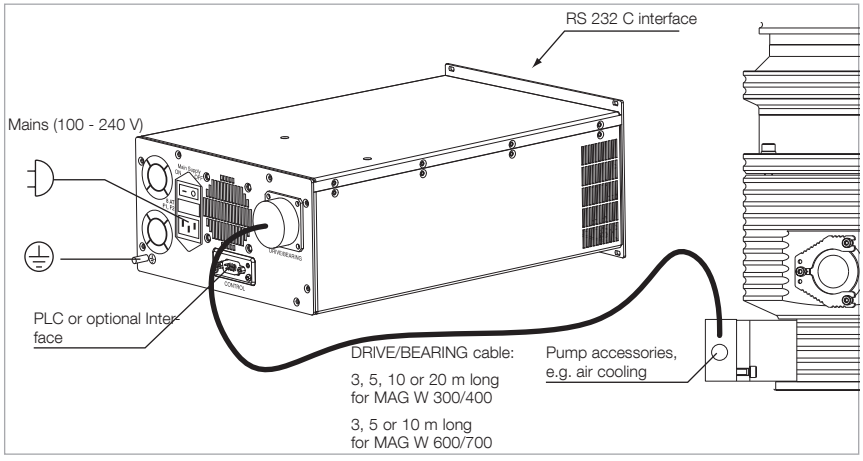
MAG.DRIVE S with display

Advantages to the User

- Operation of turbomolecular pumps with magnetically levitated rotors:
  MAG W 300/400 P and
  MAG W 600/700 P
- Easy operation through the controls
- Communication to host computer of the customer via serial interface and conventional interface possible
- Setting of speed and other functions
- Warning in case the pump is running out of specification
- Storing of all parameters in the pump's memory
- Small size and low weight
- Integrated fan
- 2 slots for industrial communications modules
  - rear side:
    Standard 9 pin 24 V SPS
    PLC-IO in Control Slot
  - front side:
    RS 232 C in Service Slot
  - further interfaces can be fitted:
    Ethernet, Profibus, DeviceNet,
    RS 485 C



Dimensional drawing for the MAG.DRIVE S



Connection schematic MAG.DRIVE S

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data

MAG.DRIVE S

Voltage range	V	100 – 240, ±10%
Nominal frequency	Hz	50 / 60
Power consumption		
stand-by	W	100
maximum	W	400
Max. motor voltage	V	48
Max. pump current	A	6
Fuses F1, F2 5 x 20 mm		10 A fast blow high breaking capacity 250 V
System fuse		L or G characteristic
Max. frequency	Hz	0 to 2000
Load capability, relay output X1	V / A	32 / 0,5
Temperature		
during operation	°C (°F)	0 to +45 (+32 to +113)
during storage	°C (°F)	-10 to +60 (+14 to +140)
Relative humidity of the air	%	95 (non-condensing)
Weight, approx.	kg (lbs)	65 (14.35)

Ordering Information

MAG.DRIVE S

	Part No.
Electronic frequency converter MAG.DRIVE S with display	**410300V0212**
Connecting cable DRIVE/BEARING (connection between pump and MAG.DRIVE S)	
3.0 m (10.5 ft)	**410300V4003**
5.0 m (17.5 ft)	**410300V4005**
10.0 m (35.0 ft) [1]	**410300V4010**
20.0 m (70.0 ft) [1]	**410300V4020**
Mains cable	
3.0 m (10.5 ft)	
EURO plug	**800102V0002**
US plug 5-15 P	**800102V1002**
2.0 m (7.5 ft)	
US plug 115 V AC	**992 76 513**

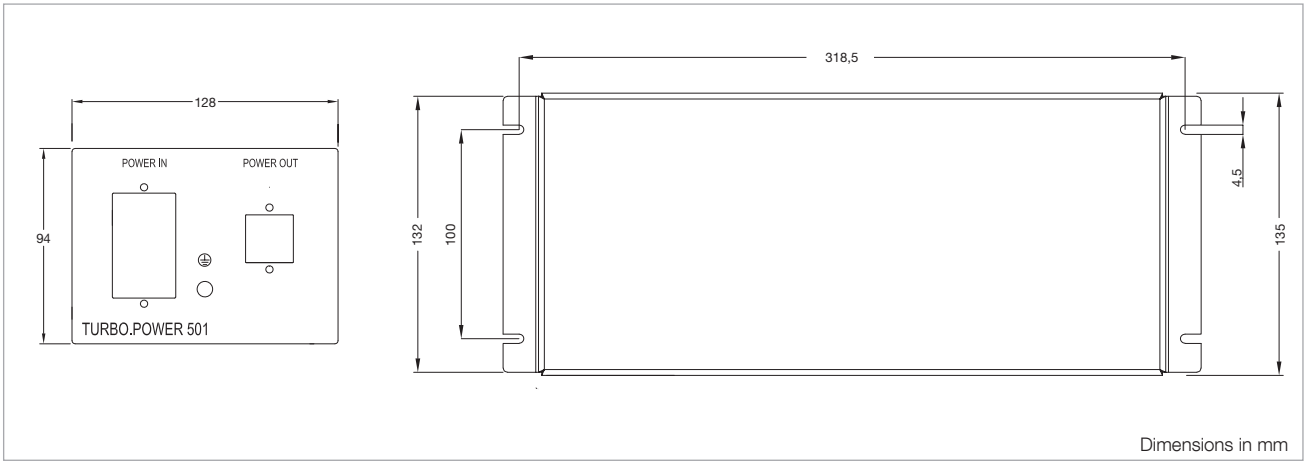
[1] Suited for operating the MAG W 300/400 only

Power Supply TURBO.POWER 501

for TURBOVAC MAG W 300/400/600/700 iP



TURBO.POWER 501 (Fig.similar)



Dimensional drawing for the power supply TURBO.POWER 501

Technical Features

- For supplying 48 V DC power to the MAG W 300/400/600/700 iP
- Bench top unit or for cabinet mounting

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data

		Power Supply TURBO.POWER 501
Power supply (POWER IN)	V	100 – 240, ±10%
Nominal frequency	Hz	50 / 60
Power consumption		
maximum	VA	650
at ultimate pressure operation of the pump	VA	450
DC voltage range		
POWER OUT	V DC	48
max.	A	10
Length of the DC connection cable, max.		
at 3 x 1.5 mm²	m (ft)	5 (17.5)
at 3 x 2.5 mm²	m (ft)	20 (70.0)
Ambient temperature		
during operation	°C (°F)	+10 to +40 (+50 to +104)
during storage	°C (°F)	-10 to -70 (+14 to -94)
Relative humidity of the air	%	5 to 85 (non-condensing)
Protection class	IP	30
Overvoltage category		II
Pollution category		2
Weight, approx.	kg (lbs)	4.0 (8.8)

Ordering Information

	Power Supply TURBO.POWER 501 Part No.
Power supply TURBO.POWER 501	**410300V5221**
DC cable (connection between TURBO.POWER 501 and MAG.DRIVE iS)	
1.0 m (3.5 ft)	**410300V2001**
3.0 m (10.5 ft)	**410300V2003**
5.0 m (17.5 ft)	**410300V2005**
10.0 m (35.0 ft)	**410300V2010**
20.0 m (70.0 ft)	**410300V2020**
Mains cable	
3.0 m (10.5 ft)	
EURO plug	**800102V0002**
US plug 5-15 P	**800102V1002**
2.0 m (7.5 ft)	
US plug 115 V AC	**992 76 513**

Vibration Absorber

Vibration absorbers are used to inhibit the propagation of vibrations from the turbomolecular pump to highly sensitive instruments like electron beam microscopes, micro-balances or analytical instruments.

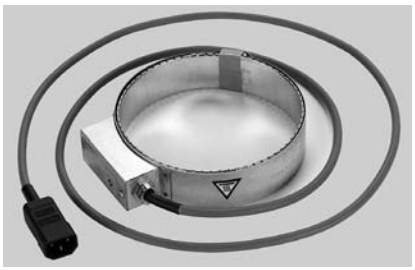


Ordering Information — Vibration Absorber

		Part No.
Vibration absorber		
DN 63 ISO-K	66 mm (2.60 in.) long	**800131V0063**
DN 63 CF	81 mm (3.19 in.) long	**500 070**
DN 100 ISO-K	84 mm (3.31 in.) long	**800131V0100**
DN 100 CF	100 mm (4.09 in.) long	**500 071**
DN 160 ISO-K	84 mm (3.31 in.) long	**500 073**
DN 160 CF	104 mm (4.09 in.) long	**500 072**

Flange Heater for CF High Vacuum Flanges

Most TURBOVAC pumps can be baked out in order to improve the ultimate pressure attained in the UHV range. Degassing of the turbomolecular pump will only be useful when simultaneously baking out the vacuum chamber.



Technical Data — Flange Heater

Rated power consumption of the flange heater		
DN 63 CF, DN 100 CF	W	100
DN 160 CF	W	150
Voltage	V AC	230 or 115
Cable length	mm	1600
Max. temperature	°C	100

Ordering Information — Flange Heater

	Part No.	Part No.
Flange heater	230 V	115 V
DN 63 CF	**800137V0003**	**800137V0004**
DN 100 CF	**800137V0005**	**800137V0006**
DN 160 CF	**800137V0007**	**800137V0008**

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Fine Filter

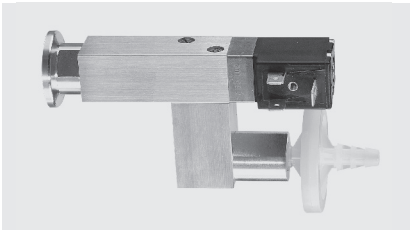
A fine filter integrated in the centering ring protects the pump against particles and dust on the high vacuum side.



Ordering Information — Fine Filter

	Part No.
Connection flange of the fine filter	
DN 40 ISO-KF	**883 98**
DN 63 ISO-K	**887 20**
DN 100 ISO-K	**887 21**

Solenoid Venting Valve



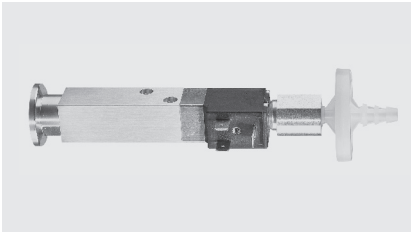
Technical Data — Venting Valve

Drive voltage	V DC	24
Power consumption	W	4
Connecting flange	DN	16 ISO-KF
Weight, approx.	kg (lbs)	0.3 (0.66)

Ordering Information — Venting Valve

	Part No.
Solenoid venting valve, normally closed	**800120V0011**

Power Failure Venting Valve



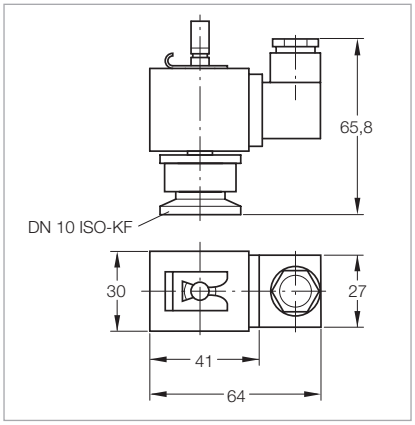
Technical Data — Power Failure Venting Valve

Drive voltage	V DC	24
Power consumption	W	4
Connecting flange	DN	16 ISO-KF
Weight, approx.	kg (lbs)	0.3 (0.66)

Ordering Information — Power Failure Venting Valve

	Part No.
Power failure venting valve, normally open	**800120V0021**

Power Failure Venting Valve, Electromagnetically Actuated



Dimensional drawing for the electromagnetically astuated power failure venting valve

Technical Data — Power Failure Venting Valve

Technical data	See Catalog “Valves”, para. “Special Valves”

Ordering Information — Power Failure Venting Valve

	Part No.
Power failure venting valve DN 10 ISO-KF, electromagnetically actuated	
24 V DC	**174 46**
230 V AC / 50/60 Hz	**174 26**

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

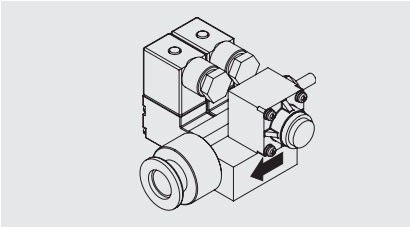
Purge Gas and Venting Valve



Technical Data		Purge Gas and Venting Valve
Connecting flange	DN	10 ISO-KF
Weight, approx.	kg (lbs)	0.7 (1.55)

Ordering Information	Purge Gas and Venting Valve
	Part No.
Purge gas and venting valve, 230 V	
0.2 mbar x l/s (12 sccm)	**855 19**
0.4 mbar x l/s (24 sccm)	**855 29**

Purge Gas and Venting Valve

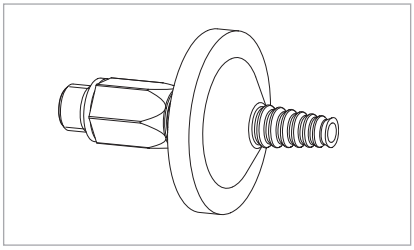


Technical Data		Purge Gas and Venting Valve
Connecting flange		
Inlet		1/4" tube
Outlet		pump specific or DN 16 ISO-KF
Purge gas pressure, abs.	bar	1.5 to 6,0
Weight, approx.	kg (lbs)	0.5 (1.1)

Ordering Information	Purge Gas and Venting Valve
	Part No.
Purge gas and venting valve, 24 V DC	
0.6 mbar x l/s	**121 33**

Further 0.6 mbar x l/s valves upon request

Gas Filter to G 1/4" for Purge Gas and Venting Valve



Technical Data	Gas Filter
Gasfilter including fitting G 1/4" and 2 gaskets	

Ordering Information	Gas Filter
	Part No.
Gas filter to G 1/4" for seal gas and venting valve	**800110V0012**
Replacement filter for gas filter to G 1/4" for seal gas and venting valve	**E 200 18 515**

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Accessories for Serial Interfaces RS 232 C and RS 485 C

Through these accessories many control, monitoring and information capabilities can be implemented in connection with the electronic frequency converters and turbomolecular pumps.

All turbomolecular pumps or electronic frequency converters are supported.

PC Software LEYASSIST



Software for PC-based communication, control and monitoring of turbomolecular pumps via USB, RS 485 or RS 232 interface with automatic pump detection.

Functions

- Display of vacuum system status
- Configuring the accessory functions of the TURBOVAC i / iX
- Reading/writing of parameters
- Data logging
- Alarm/warning message logging

Ordering Information **PC Software LEYASSIST**

	Part No.
PC software LEYASSIST	**230439V01**

Interface Adaptor for Frequency Converter with RS 232 C/RS 485 C Interface

Ordering Information **Interface Adaptor RS 232 C/RS 485 C**

	Part No.
Adaptor RS 232 C/RS 485 C mains connection 230 V, 50 Hz, EURO plug	**800110V0101**
Adaptor USB/RS 232 C for connection of RS 232 C to USB (PC), including CD with drivers and manual	**800110V0103**

Services for Mechanically Suspended Turbomolecular Pumps

Complete Refurbishing at the Service Centre

Complete refurbishing at the service centre includes the following:
Complete disassembly, cleaning, replacement of all wearing parts, mounting, electrical safety test, final test including vibration measurement

Complete Refurbishing with Decontamination at the Service Centre

Complete refurbishing with decontamination at the service centre includes the following:
Complete disassembly, cleaning and decontamination, replacement of all wearing parts, mounting, electrical safety test, final test including vibration measurement

Ordering Information	Complete Refurbishing at the Service Centre	Complete Refurbishing with Decontamination at the Service Centre
	Part No.	**Part No.**
For pump		
TURBOVAC 35 / 50D	**AS 2165**	**AS 2165 D**
TURBOVAC 50	**AS 2133**	**AS 2133 D**
TURBOVAC SL 80	**LAS 2368**	**LAS 2368 D**
TURBOVAC TW 70 H	**AS 2368**	**AS 2368 D**
TURBOVAC 151	**AS 2134**	**AS 2134 D**
TURBOVAC TW 250 S	**AS 2168**	**AS 2168 D**
TURBOVAC SL 300	**LAS 2369**	**LAS 2369 D**
TURBOVAC TW 300	**AS 2369**	**AS 2369 D**
TURBOVAC 361	**AS 2135**	**AS 2135 D**
TURBOVAC 600 / 1000	**AS 2136**	**AS 2136 D**
TURBOVAC TW 701 / 690	**AS 2330**	**AS 2330 D**
TURBOVAC 1100	**AS 2137**	**AS 2137 D**

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Services for Magnetically Levitated Turbomolecular Pumps

Complete Refurbishing at the Service Centre

Complete refurbishing at the service centre includes the following:
Complete disassembly, cleaning, replacement of all wearing parts, mounting, electrical safety test, final test including vibration measurement

Complete Refurbishing with Decontamination at the Service Centre

Complete refurbishing with decontamination at the service centre includes the following:
Complete disassembly, cleaning and decontamination, replacement of all wearing parts, mounting, electrical safety test, final test including vibration measurement

Ordering Information	Complete Refurbishing at the Service Centre	Complete Refurbishing with Decontamination at the Service Centre
	Part No.	**Part No.**
For pump		
MAG W 300 / 400	**AS 2300**	**AS 2300 D**
MAG W 600 / 700	**AS 2600**	**AS 2600 D**
MAG W 1300 iP (L) – 2201 iP (L)	**AS 2700**	**AS 2700 D**
MAG (W) 1600 / 2000	**AS 2164** [1)]	**AS 2164 D** [1]
MAG (W) 830 / 1300 / 1500	**AS 2370** [1)]	**AS 2370 D** [1)]
MAG 900 / 1000 / 1200	**AS 2160** [1)]	**AS 2160 D** [1)]
MAG 2200	**AS 2200** [1)]	**AS 2200 D** [1)]
MAG 2800 / 3200	**AS 2800** [1)]	**AS 2800 D** [1)]

Notes

The listed services include the costs for material and working hours for standard pumps. Services for pump variants upon request.
If additional spare parts are needed for repairs, then these are invoiced separately according to a cost estimate.

[1)] Including rotor replacement

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Applications and Accessories for Oil Diffusion Pumps

Pumps / Application	DIP 3000	DIP 8000	DIP 12000	DIP 20000	DIP 30000	DIP 50000	DIJ 10* / 320	DIJ 16* / 500	DIJ 20 / 630	DIJ 35* / 1000	OB 6000	OB 12000	OB 18000	LEYBOJET 630
Vacuum coating (e.g. Sputtering)	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Research and development	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Metallurgy/furnaces	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Mechanical engineering	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Sputtering process							■	■	■	■	■	■	■	■
Secondary metallurgy (e.g. VIM, VID)											■	■	■	
High vacuum furnaces											■	■	■	
Cristal growing plants							■	■	■	■				
Electron beam welding							■	■	■	■				
Nitride hardening							■	■	■	■				
Drying plants							■	■	■	■				

* DIJ 35 available from November 2017, DIJ 10 and DIJ 16 available from March 2018

Accessories	Page	DIP 3000	DIP 8000	DIP 12000	DIP 20000	DIP 30000	DIP 50000	DIJ 10* / 320	DIJ 16* / 500	DIJ 20 / 630	DIJ 35* / 1000	OB 6000	OB 12000	OB 18000	LEYBOJET 630
Astrotorus baffle	84	■	■	■	■	■	■	■	■	■	■				■
Over-temperature protection switch	86	■	■	■	■	■	■	■	■	■	■				■
Contact thermometer	86	■	■	■	■	■									■
Resistance thermometer Pt100	86	■	■	■	■	■									■
Water flow monitor	87	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Power controller	88				■	■	■					■	■	■	■
Adsorption trap	90	For generating an oil-free vacuum with oil sealed backing pumps													
Valve	92	Right-angle valve with, electropneumatically operated, DN 250 ISO-K to DN 1000 ISO-K													

Oil for Diffusion Pumps for different fields of application

Application / LEYBONOL Oils	Vacuum coating	Research and development	Metallurgy/furnaces	Mechanical engineering	Sputter processes
LVO 500	■	■	■	■	■
LVO 510	●	●	●	●	●
LVO 520	●	●			
LVO 530	●	●			
LVO 540 [1)]	■	■	■	■	■

■ = Standard
● = Possible

[1)] Only for OB pumps

The table only lists general applications. Your specific requirements might be subject to deeper analysis.
For further questions, please contact our technical Sales support.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Oil for Diffusion Pumps for different pump types

Pumps	DIP 3000	DIP 8000	DIP 12000	DIP 20000	DIP 30000	DIP 50000	DIJ 10* / 320	DIJ 16* / 500	DIJ 20 / 630	DIJ 35* / 1000	OB 6000	OB 12000	OB 18000	LEYBOJET 630
LEYBONOL Oils														
LVO 500	■	■	■	■	■	■	■	■	■	■				■
LVO 510	●	●	●	●	●	●	●	●	●	●				●
LVO 520	●	●	●	●	●	●	●	●	●	●				●
LVO 530	●	●	●	●	●	●	●	●	●	●				●
LVO 540											■	■	■	

■ = Standard
● = Possible

Note

All oils may be used.
The pumps are supplied as standard without oil.

The table only lists general applications. Your specific requirements might be subject to deeper analysis. For further questions, please contact our technical Sales support.

For information on oil specifications please refer to Catalog Part "Oils / Greases / Lubricants LEYBONOL®".

Operating Principle of Fluid Entrainment Vacuum Pumps

The main components of diffusion pumps, the operation of which relies on vapor-phase pump fluids are:

- Cooled pump body with intake and exhaust ports
- System of nozzles
- Pump boiler

In the case of diffusion pumps a pump fluid contained in a boiler is heated to such an extent that it is vaporized. The vapor is then forced through nozzles within the pump. The nozzles are generally designed in such a way, that they accelerate the vapor to a speed exceeding the speed of sound (Laval nozzles), thus creating a high speed vapor jet. The vapor is then deflected by the nozzles at a specific angle onto the pump body. The pump body is cooled, so that the vaporized pump fluid condenses and is returned back to the boiler as a liquid. The pumping action of diffusion pumps and fluid entrainment pumps in general is based on the transporting capacity of the vapor jet.

The gas which is to be pumped is compressed sufficiently at the fore-vacuum port so that it can be pumped out by a backing pump.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Oil Diffusion Pumps

Compared to other fluid entrainment pumps the density of the vapor in the boiler and in the vapor jet is fairly low so that the gas molecules may almost completely diffuse into the vapor jet. Thus most of the molecules which enter the vapor jet are also pumped out.

For this reason, the pumping speed of diffusion pumps is extremely high with respect to the intake area and constant – starting at an inlet pressure of approx. 10^{-3} mbar (0.75 x 10^{-3} Torr) down to very low pressures – as within the pressure range the vapor jet is not influenced in any way by the pressure within the vacuum vessel.

Operating Oil Diffusion Pumps

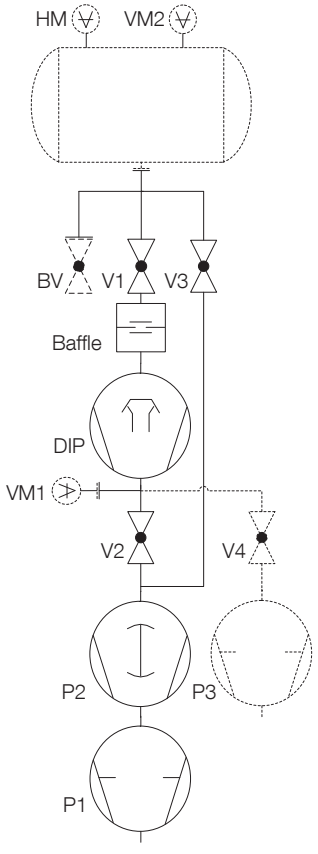
Forevacuum

In all cases diffusion pumps require a sufficiently sized backing pump (see Technical Data). The size and type of forevacuum pump depends on the operating conditions and the quantities of gas which are to be pumped.

1. Continuous operation at operating pressures above 10^{-4} mbar (0.75 x 10^{-4} Torr) – large quantities of gas.
2. Continuous operation at operating pressures below 10^{-4} mbar (0.75 x 10^{-4} Torr) – smaller quantities of gas.

In applications which rely on diffusion pumps, the vacuum chamber must be connected via a valve **(3)** and a roughing line directly to the backing pump. This is done so that the vacuum chamber may be pre-evacuated by the backing pump down to a pressure where the diffusion pump can take over. Until the high vacuum valve **(4)** opens, both diffusion pump and pump fluid are preserved. Before venting the vacuum chamber the forevacuum valve **(2)** and the high vacuum valve **(4)** must be closed, whereby the diffusion pump remains in the ready status.

DIJ	Oil diffusion pump with cold cap baffle
P1	Rotary vane vacuum pump
P2	Roots vacuum pump
P3	Rotary vane vacuum pump (optional as support pump)
V1	High-vacuum valve
V2	Forevacuum valve
V3	Bypass valve
V4	DIJ forevacuum valve (optional for support vacuum)
Baffle	Vapor baffle
BV	Airing valve
HM	High-vacuum measurement point
VM1	Forevacuum measurement point (DIJ)
VM2	Forevacuum measurement point (vacuum chamber customer)



Schematic for a diffusion-type vacuum pump system

Pumping Speed

The pumping speed of any pump is equivalent to the volume throughput through the intake opening of a pump. In the case of diffusion pumps the pumping speed for lighter gases is higher compared to heavier gases.

Backstreaming of the Pump Fluid

Undesirable backstreaming of molecules from the pump fluid is caused by the effect that some molecules are able to leave the vapor jet and thus do not arrive at the cooled pump body. Because of collisions between each other and due to reflection at the pump body, these molecules are then able to move in the direction of the vacuum chamber.

For DIP pumps the backstreaming effect amounts only to a few µg per cm^2 of intake area per minute. Backstreaming may be almost completely suppressed by including a cold cap baffle or an additional Astrotorus baffle.

Backstreaming of Oil in the Case of Diffusion Pumps

- Pump without baffle
  approx. 1 x 10^{-2} mg x cm^{-2} x min^{-1}
- Pump with cold cap baffle
  approx. 1 x 10^{-3} mg x cm^{-2} x min^{-1}
- Pump with Astrotorus baffle
  (T = 10 °C (50 °F))
  approx. 1 x 10^{-5} mg x cm^{-2} x min^{-1}

The values stated have been measured at an intake pressure of < 1 x 10^{-4} mbar and apply to LEYBONOL LVO 500.

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Attainable Ultimate Pressure

The attainable ultimate pressure for a particular vacuum system depends not only on the type and pumping speed rating of the diffusion pump, but also on the vapor pressure of the pump fluid, shape and temperature of the baffle, leaks at connecting flanges or welded joints and the condition of the surfaces within the vacuum chamber.

When excluding all effects which contribute to an increase in pressure within the vacuum chamber due to leaks and contamination of the vacuum chamber walls, it will be possible to attain the ultimate pressures stated in the table "Attainable Ultimate Pressures with Oil Diffusion Pumps (DIP)" given in chapter "General".

In practice the following combination has been found to work very well when needing a low vacuum free of oil vapors.

- Water-cooled cold cap baffle as a integral part of the diffusion pump together with a water-cooled Astrotorus baffle which may be installed as an additional component on the high vacuum flange of the diffusion pump.

Sealing Methods

For ultimate pressures down to 10^{-8} mbar (0.75×10^{-8} Torr) bakeout temperatures of up to 150 °C (302 °F) are sufficient. FPM [FKM (= Fluor caoutchouc), temperature resistant up to 150 °C (302 °F)] sealing rings or ultra sealing rings made of aluminum must be used.

In order to prevent pressure variations, ultra sealing rings must be used in the connections, between diffusion pump and baffle.

Ultimate pressures below 10^{-8} mbar (0.75×10^{-8} Torr) require bakeout temperatures up to 400 °C (752 °F). However, it is only necessary to bake out the vacuum chamber to 400 °C (752 °F) and to maintain a temperature gradient across the baffle or the cold trap so that a temperature of 150 °C (302 °F) is not exceeded at the intake flange of the pump.

In this way, it is still acceptable to use FPM (FKM) sealing rings or ultra sealing rings made of aluminium.

Cooling

The cooling water temperature should not exceed 25 °C (77 °F) at the intake and 30 °C (86 °F) at the discharge, otherwise sufficient condensation of the pump fluid cannot be ensured. When connecting the cooling system of the pump and the baffle in series, the cooling water must always be made to flow through the baffle first and then through the diffusion pump, because the attainable ultimate pressure in the vacuum chamber depends strongly on the condensation temperature of the pump fluid in the baffle.

Attainable Ultimate Pressures with Oil Diffusion Pumps

Attainable Ultimate Pressure [1]		LEYBONOL LVO 500
Without baffle	mbar (Torr)	1.5×10^{-6} (1.1×10^{-6})
With cold cap baffle	mbar (Torr)	5.0×10^{-7} (3.8×10^{-7})
With Astrotorus baffle	mbar (Torr)	1.5×10^{-7} (1.1×10^{-7})

[1] Attained in consideration of the notes given under "Sealing Methods" in the chapter "General" para. "Oil Diffusion Pumps" and after degassing the connected vacuum chamber for several hours at 200 °C (392 °F)

DIP Pumps Water-Cooled



DIP 12 000



DIP 20 000 with Power Controller

The DIP range of pumps was developed for operation in industrial systems. Excellent vacuum performance data combined with the inherent ruggedness of this kind of pump, make our diffusion pumps a reliable component in high and medium vacuum applications.

Advantages to the User

- High pumping speeds in the fine and high vacuum ranges
- Low attainable ultimate pressure
- Integrated, water-cooled cold cap baffle guarantees low oil backstreaming rates into the vacuum chamber
- Low oil losses (even at high gas throughputs) by integrated water-cooled forevacuum baffle
- High forevacuum resistance even at reduced heating power
- The heating cartridges are accessible from the outside via heating inserts which are built into the boiler. This ensures a quick exchange of single heating cartridges (even when the pump is hot)
- A separate automatic circuit breaker for each heating cartridge ensures a high level of electrical safety
- A standard built-in thermostat acts as an thermal overload switch and ensures that the heating cartridges can not overheat
- All pumps are prepared for installation with an over-temperature switch (optional) for checking the cooling water circuit, and a contact thermometer (optional) to monitor the operating temperature of the diffusion pump
- Indication of the oil level by sight-glass permits simple checking of the current oil level
- All DIP pumps are delivered with their inside chamber cleaned in such a manner that it is free of oil. The inside is evacuated. In the condition as delivered, the pumps may be also operated with silicone oil
- Utilisation of the DIP power controller cuts power consumption by up to 30% without impairing pump performance (option)

Typical Applications

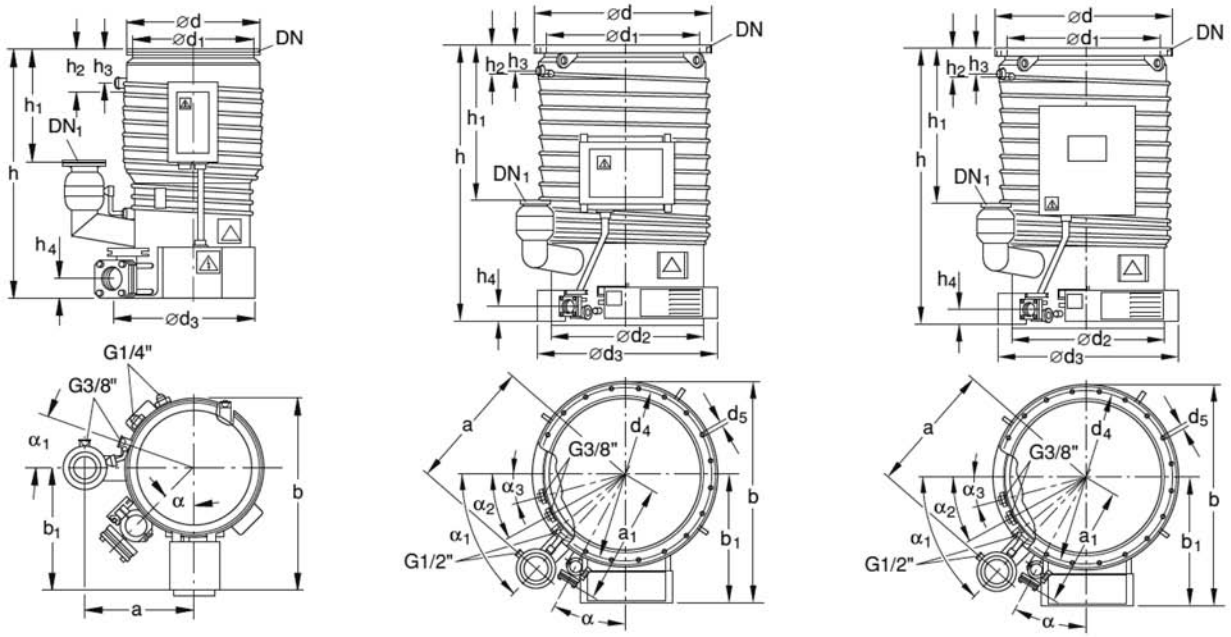
The diffusion pumps from the DIP range are used in coating systems, vacuum melting and drying systems as well as in vacuum furnaces in the area of metallurgy.

Supplied Equipment

The DIP pumps are supplied ready for connection but without the filling of pump fluid.

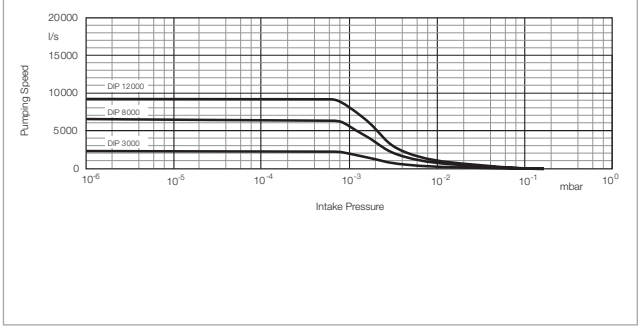
The inside of the pump is cleaned before delivery to such an extent that it is free of oil. The inside is evacuated. High and forevacuum flanges are equipped with gaskets and centering rings having shipping flanges and complete with clamping components.

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

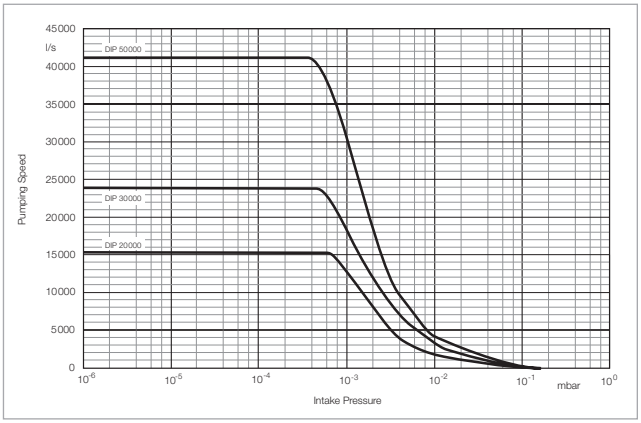


DIP	3 000	8 000	12 000	20 000	30 000	50 000
DN	250 ISO-K	400 ISO-K	500 ISO-K	630 ISO-F	800 ISO-F	1000 ISO-F
DN_1	63 ISO-K	63 ISO-K	100 ISO-K	100 ISO-K	160 ISO-K	160 ISO-K
a	240 (9.45)	350 (13.78)	420 (16.54)	540 (21.26)	600 (23.62)	800 (31.5)
a_1	250.5 (9.86)	375.5 (14.78)	432 (17)	496 (19.53)	536 (21.10)	636 (25.04)
b	443 (17.44)	643 (25.31)	775 (30.51)	980 (38.58)	1150 (45.28)	1350 (53.15)
b_1	276 (10.87)	373 (14.69)	460 (18.11)	600 (23.62)	690 (27.17)	790 (31.10)
d	290 (11.42)	450 (17.72)	550 (21.65)	750 (29.53)	920 (36.22)	1120 (44.09)
d_1	261 (10.28)	400 (15.75)	50119.72)	651 (25.63)	800 (31.5)	1000 (39.37)
d_2	–	405 (15.94)	506 (19.92)	636 (25.04)	716 (28.19)	916 (36.06)
d_3	278 (10.94)	530 (20.87)	630 (24.80)	760 (29.92)	840 (33.07)	1040 (40.94)
d_4	–	–	–	720 (28.35)	890 (35.04)	1090 (42.91)
d_5	–	–	–	14 (0.55)	14 (0.55)	14 (0.55)
Quantity of holes	–	–	–	20	24	32
h	560 (22.05)	785 (30.91)	940 (37)	1130 (44.49)	1450 (57.09)	1880 (74.02)
h_1	250 (9.84)	400 (15.75)	470 18.5)	620 (24.41)	870 (34.25)	1275 (50.2)
h_2	68 (2.68)	88 (3.46)	92 (3.62)	97 (3.82)	102 (4.02)	102 (4.02)
h_3	75 (2.95)	102 (4.02)	106 (4.17)	110 (4.33)	116 (4.57)	116 (4.57)
α	45°	30°	30°	30°	20°	25°
α_1	20°	45°	45°	45°	45°	45°
α_2	–	30°	30°	30°	30°	25°
α_3	–	15°	15°	15°	15°	15°

Dimensional drawing for the DIP 3000 [left], DIP 8000 and DIP 12000 [middle], DIP 20 000 to DIP 50 000 [right]; dimensions in brackets ( ) are in inch



Pumping speed characteristics of the DIP 3000 to 12000 pumps as a function of intake pressure



Pumping speed characteristics of the DIP 20000 to 50000 pumps as a function of intake pressure

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data

	DIP 3 000	DIP 8 000	DIP 12 000
High vacuum / forevacuum connection DN	250 ISO-K / 63 ISO-K	400 ISO-K / 63 ISO-K	500 ISO-K / 100 ISO-K
Pumping speed for air [1] below 1 x 10^{-4} mbar l/s	3 000	8 000	12 000
Operating range mbar (Torr)	< 10^{-2} to 10^{-7} (0.75 x 10^{-2} to 0.75 x 10^{-7})	< 10^{-2} to 10^{-7} (0.75 x 10^{-2} to 0.75 x 10^{-7})	< 10^{-2} to 10^{-7} (0.75 x 10^{-2} to 0.75 x 10^{-7})
Ultimate total pressure [1] mbar (Torr)	< 5.0 x 10^{-7} (3.75 x 10^{-7})	< 5.0 x 10^{-7} (3.75 x 10^{-7})	< 5.0 x 10^{-7} (3.75 x 10^{-7})
Max. permissible forevacuum pressure mbar (Torr)	6.0 x 10^{-2} (4.5 x 10^{-2})	6.0 x 10^{-2} (4.5 x 10^{-2})	6.0 x 10^{-2} (4.5 x 10^{-2})
Pump fluid filling, min. / max. l (qts)	1.0 / 1.4 (1.1 / 1.5)	1.7 / 3.4 (1.8 / 3.6)	2.4 / 5.3 (2.5 / 5.6)
Mains connection			
Standard EURO, 50/60 Hz V	230 ~ 1 Ph	400 ~ 3 Ph Y	400 ~ 3 Ph Y
Standard Americas, 50/60 Hz V	230 ~ 1 Ph	460 ~ 3 Ph Y	460 ~ 3 Ph Y
Special, 50/60 Hz V	–	230 ~ 3 Ph Δ	230 ~ 3 Ph Δ
Heating power kW	2.4	4.8	7.2
Number of heating cartridges	2	6	9
Heating up time min	< 25	< 25	< 25
Cooling water (minimum)			
for pump [2] l/h (gal/min)	160 (0.7)	290 (1.28)	500 (2.2)
for cold cap baffle l/h (gal/min)	20 (0.09)	30 (0.13)	50 (0.22)
max. supply pressure bar (psig)	6 (87)	6 (87)	6 (87)
Number of cooling circuits (including cold cap baffle)	2	2	2
Cooling water connection			
for pump G (BPS)	3/8"	1/2"	1/2"
for cold cap baffle G (BPS)	1/4"	3/8"	3/8"
Weight, approx. kg (lbs)	29 (64)	70 (154)	102 (225)
Recommended backing pump [3] at operating pressures > 10^{-4} mbar (> 0.75 x 10^{-4} Torr)	TRIVAC D 65 B + W 251	SV 300 + W 251	SV 300 + W 501
at operating pressures < 10^{-4} mbar (< 0.75 x 10^{-4} Torr)	–	TRIVAC D 65 B + W 251	TRIVAC D 65 B + W 251

Ordering Information

	DIP 3 000	DIP 8 000	DIP 12 000
	Part No.	**Part No.**	**Part No.**
Oil diffusion pump			
Standard EURO	**222 10**	**222 20**	**222 25**
Standard Americas	**222 10**	**500 670**	**500 591**
Special	**–**	**500 649**	**22225V003**
Astrotorus baffle	**227 50**	**227 60**	**227 65**
Water flow monitor	**500006623**	**500006623**	**500006623**
Over-temperature protection switch	**122 84**	**122 84**	**122 84**
Contact thermometer	**218 81**	**218 81**	**218 81**
Resistance thermometer Pt100 sensor	**200 02 958**	**200 02 958**	**200 02 958**
Pump fluid [4]	see Catalog Part "Oils / Greases / Lubricants LEYBONOL"		

[1] Measured to DIN 28 427 with **LEYBONOL LVO 500** as the pump fluid

[2] The required quantity of cooling water refers to ΔT = 10 °C (50 °F). The discharge temperature should not exceed 30 °C (86 °F)

[3] Single- or two-stage rotary vane vacuum pump (TRIVAC; SOGEVAC) from our range of forevacuum pumps jointly with Roots vacuum pumps (RUVAC) in pump systems

[4] Oil must be purchased separately

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data

	DIP 20 000	DIP 30 000	DIP 50 000
High vacuum / forevacuum connection DN	630 ISO-F / 100 ISO-K	800 ISO-F / 160 ISO-K	1000 ISO-F / 160 ISO-K
Pumping speed for air [1] below 1 x 10^{-4} mbar l/s	20 000	30 000	50 000
Operating range mbar (Torr)	< 10^{-2} to 10^{-7} (0.75 x 10^{-2} to 0.75 x 10^{-7})	< 10^{-2} to 10^{-7} (0.75 x 10^{-2} to 0.75 x 10^{-7})	< 10^{-2} to 10^{-7} (0.75 x 10^{-2} to 0.75 x 10^{-7})
Ultimate total pressure [1] mbar (Torr)	< 5.0 x 10^{-7} (3.75 x 10^{-7})	< 5.0 x 10^{-7} (3.75 x 10^{-7})	< 5.0 x 10^{-7} (3.75 x 10^{-7})
Max. permissible forevacuum pressure mbar (Torr)	6.0 x 10^{-2} (4.5 x 10^{-2})	6.0 x 10^{-2} (4.5 x 10^{-2})	6.0 x 10^{-2} (4.5 x 10^{-2})
Pump fluid filling, min. / max. l (qts)	7.0 / 11.0 (7.4 / 11.6)	10.0 / 15.0 (10.6 / 15.9)	15.0 / 25.0 (15.9 / 26.4)
Mains connection			
Standard EURO, 50/60 Hz V	400 ~ 3 Ph Y	400 ~ 3 Ph Y	400 ~ 3 Ph Y
Standard Americas, 50/60 Hz V	460 ~ 3 Ph Y	460 ~ 3 Ph Y	460 ~ 3 Ph Y
Special, 50/60 Hz V	230 ~ 3 Ph Δ	230 ~ 3 Ph Δ	230 ~ 3 Ph Δ
Reduced power consumption through power controller (saves up 30%) kW	8.4	12.6	16.8
Heating power kW	12	18	24
Number of heating cartridges	12	18	24
Heating up time min	< 25	< 30	< 30
Cooling water (minimum)			
for pump [2] l/h (gal/min)	600 (2.6)	900 (4.0)	1500 (6.6)
for cold cap baffle l/h (gal/min)	60 (0.26)	80 (0.35)	150 (0.66)
max. supply pressure bar (psig)	6 (87)	6 (87)	6 (87)
Number of cooling circuits (including cold cap baffle)	2	3	3
Cooling water connection			
for pump G (BPS)	1/2"	1/2"	1/2"
for cold cap baffle G (BPS)	3/8"	3/8"	3/8"
Weight, approx. kg (lbs)	172 (379)	296 (653)	560 (1235)
Recommended backing pump [3]			
at operating pressures > 10^{-4} mbar (> 0.75 x 10^{-4} Torr)	SV 200 + W 501	SV 300 + W 1001	SV 630 B + W 2001
at operating pressures < 10^{-4} mbar (< 0.75 x 10^{-4} Torr)	TRIVAC D 65 B + W 251	SV 300 + W 251	SV 300 + W 501

Ordering Information

	DIP 20 000	DIP 30 000	DIP 50 000
	Part No.	**Part No.**	**Part No.**
Oil diffusion pump			
Standard EURO with control unit	**222 30V001**	**222 35V001**	**222 40V001**
Standard Americas with control unit	**222 30V002**	**222 35V002**	**222 40V002**
Standard EURO	**222 30**	**222 35**	**222 40**
Standard Americas	**500 882**	**500 665**	**500 728**
Special	**22230V004**	**22235V006**	**500 654**
Retrofit kit energy control unit	**503 647V001**	**503 648V001**	**503 649V001**
Retrofit kit energy control unit US	**503 647V002**	**503 648V002**	**503 649V002**
Astrotorus baffle	**227 70**	**227 75**	**227 80**
Water flow monitor	**500006623**	**500006623**	**500006623**
Over-temperature protection switch	**122 84**	**122 84**	**122 84**
Contact thermometer	**218 81**	**218 81**	**218 81**
Resistance thermometer Pt100 sensor	**200 02 958**	**200 02 958**	**200 02 958**
Pump fluid [4]	see Catalog Part "Oils / Greases / Lubricants LEYBONOL"		

[1] Measured to DIN 28 427 with **LEYBONOL LVO 500** as the pump fluid

[2] The required quantity of cooling water refers to ΔT = 10 °C (50 °F). The discharge temperature should not exceed 30 °C (86 °F)

[3] Single- or two-stage rotary vane vacuum pump (TRIVAC; SOGEVAC) from our range of forevacuum pumps jointly with Roots vacuum pumps (RUVAC) in pump systems

[4] Oil must be purchased separately

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

DIJ Pumps
Water-Cooled



DIJ 20 with plug (right), DIJ 20 with fuse box (middle) and DIJ 630 with energy saving unit (EER) (right)

The Leybold oil diffusion pumps are ideal for all industrial high vacuum applications.

The DIJ series impresses with innovative and energy-efficiency construction.

Important features are a new heating conception; variable flange connections; fully equipped with fore line baffle and cold cap baffle; electrical connect variants and a powerful five stage nozzle system.

Advantages to the User

- Lowest operation costs by minimized energy consumption
- Stable throughput in the 10^{-2} to 10^{-3} mbar range (e.g. for sputtering or steel degassing)
- Flexible flange design
  Flange variants:
  - ANSI / Inch flanges (with O-ring)
  - ISO-F or ISO-K flanges (with centering ring)
- Highest system uptime
- Smart temperature control ensures minimum load and longest lifetime for heaters and oil
- Unique baffle design
- Various electrical connection possibilities:
  - Three different connection variants available incl. energy control system (ECU)
- 4 + 1 stage system design:
  - The 4 diffusion pump stages provide excellent high-vacuum pumping speed
  - The additional jet-stage ensures stable throughput at pressures > 10^{-3} mbar

Typical Applications

The diffusion pumps from the DIP range are used in coating systems, vacuum melting and drying systems as well as in vacuum furnaces in the area of metallurgy.

Supplied Equipment

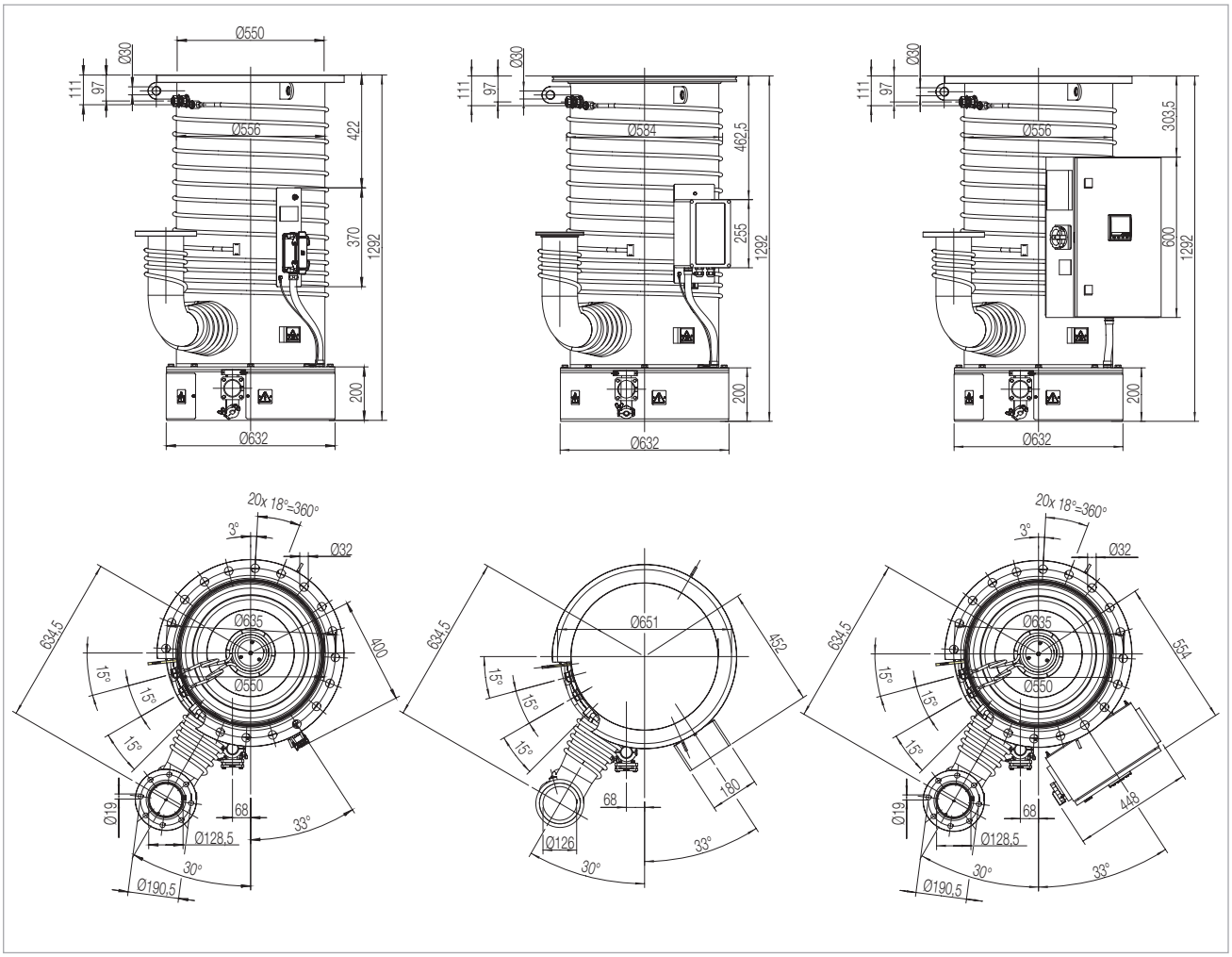
All DIJ pumps are shipped from the factory without pump fluid installed.

Included as standard equipment with the pump are

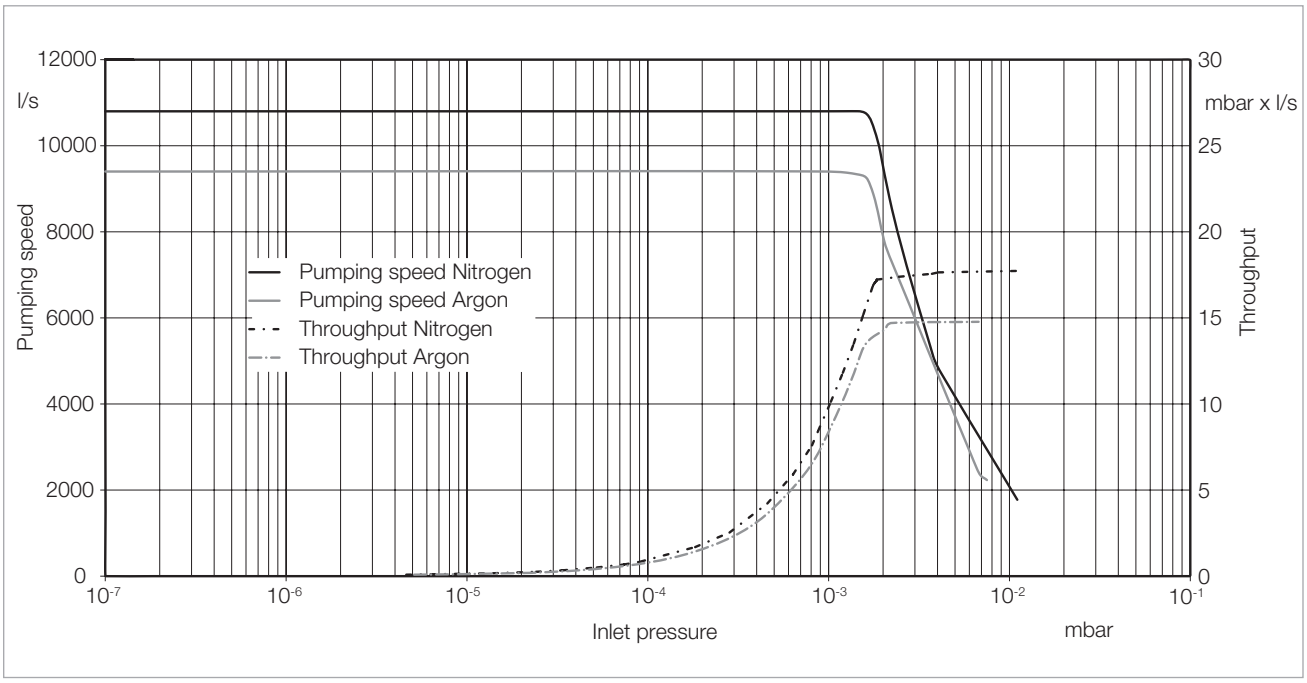
- centering ring with centering star, O-ring and outer ring for the high-vacuum flange,
- centering ring with insert for forevacuum baffle, O-ring and outer ring for the forevacuum flange.

The high-vacuum and forevacuum flanges are closed with shipping flanges and claws. The insides of the pumps have been cleaned; they are evacuated prior to shipment.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



Dimensional drawings for DIJ 20 with plug, (left), DIJ 20 with ESU (middle) and DIJ 630 with junction box (EER) (right)



Pumping speed overview for nitrogen and argon

Technical Data

		DIJ 10	DIJ 320	DIJ 16	DIJ 500	DIJ 20	DIJ 630	DIJ 35	DIJ 1000
High vacuum connection	DN	10" ANSI	320 ISO-K	16"ANSI	500 ISO-K	20" ANSI	630 ISO-K	35" ANSI	1000 ISO-F
Forevacuum connection	DN	2" ANSI	63 ISO-K	3"ANSI	100 ISO-K	4" ANSI	160 ISO-K	6" ANSI	200 ISO-K
Pumping speed [1] for Nitrogen < 10^{-4} mbar		2 800		6 800		10 800		28 000	
Working range	mbar	< 10^{-2} to 10^{-7}		< 10^{-2} to 10^{-7}		< 10^{-2} to 10^{-7}		< 10^{-2} to 10^{-7}	
Ultimate total pressure [2]	mbar	< 5 x 10^{-7}		< 5 x 10^{-7}		< 5 x 10^{-7}		< 5 x 10^{-7}	
Max. permissible forevacuum pressure	mbar	5 x 10^{-1}		5 x 10^{-1}		5 x 10^{-1}		5 x 10^{-1}	
Pump fluid fill, min. / max.	l	1.0 / 1.4		1.7 / 3.4		5.0 / 7.0		12.0 / 18.0	
Mains voltage	V	1 ~ 230 /N/PE		3 ~ 400 /N/PE		3 ~ 400 /N/PE		3 ~ 400 /N/PE	
depending on variant, 50 / 60 Hz	V	1 ~ 230 /N/PE		3 ~ 460 /N/PE		3 ~ 460 /N/PE		3 ~ 460 /N/PE	
Heating power	kW	2.4		3.6		10.8		21.6	
Number of heating cartridges		2		3		9		18	
Warm up period	min	< 25		< 25		< 25		< 30	
Coolant (minimum) [2]									
for the pump	l/h	160		290		600		1 200	
for the cold cap baffle	l/h	20		50		80		150	
Number of cooling circuits (including cold cap baffle)		2		2		2		2	
Coolant connection									
for the pump	G	3/8"		1/2"		1/2"		1/2"	
for the cold cap baffle	G	1/4"		3/8"		3/8"		3/8"	
Weight, approx.	kg	45		110		208		720	
Recom. forevacuum pumps [3]									
at working pressure > 10^{-4} mbar									
oil-sealed		SV 100 B & W 501		SV 200 & W 501		SV 300 B & W 1001		SV 630 B & W 2001	
dry-compressing		-		DV 450 & W 501		DV 450 & W 1001		DV 650 & W 2001	
at working pressure < 10^{-4} mbar									
oil-sealed		D 25 B		D 65 B & W 251		SV 100 B & W 501		SV 300 B & W 1001	
dry-compressing		ECODRY plus 60		ECODRY plus 60 & W 251		-		DV 450 & W 1001	
Recom. supporting pump [3]		TRIVAC D 25 B		TRIVAC D 40 B		TRIVAC D 65 B		TRIVAC D 65 B	

1) Measured as per DIN 28 427 using DC 704 normal as the pump fluid.
2) The coolant water volume is referenced to ΔT = 10 K. The discharge temperature should not exceed 30 °C.
3) Single- and two-stage rotary vane pumps (TRIVAC; SOGEVAC), or dry-compressing pumps (ECODRY plus ;DRYVAC) from our line of forevacuum pumps in conjunction with roots pumps (RUVAC) in pumping systems.

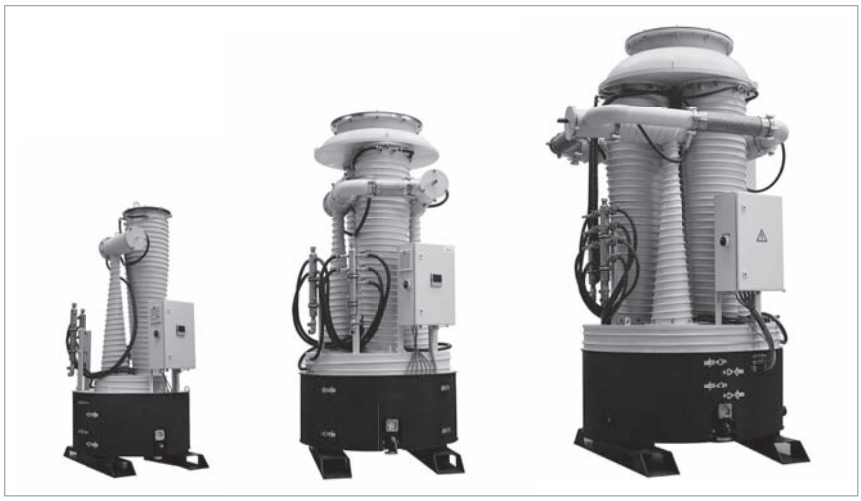
Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Ordering Information

	DIJ 10	DIJ 320	DIJ 16	DIJ 500	DIJ 20	DIJ 630	DIJ 35	DIJ 1000
	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.
with plug 400V / 50/60 Hz / 3ph PN/Y	22213V000	22214V000	22223V000	22224V000	22227V000	22228V000	22243V000	22244V000
with plug 460V / 50/60 Hz / 3ph PN/Y	22213V001	22214V001	22223V001	22224V001	22227V001	22228V001	22243V001	22244V001
with fuse box 400V / 50/60 Hz / 3ph PN/Y	22213V005	22214V005	22223V005	22224V005	22227V005	22228V005	22243V005	22244V005
with fuse box 460V / 50/60 Hz / 3ph PN/Y	22213V006	22214V006	22223V006	22224V006	22227V006	22228V006	22243V006	22244V006
with energy saving unit (EER) 400V / 50/60 Hz / 3ph PN/Y	-	-	-	-	22227V009	22228V009	22243V009	22244V009
with energy saving unit (EER) 460V / 50/60 Hz / 3ph PN/Y	-	-	-	-	22227V010	22228V010	22243V010	22244V010
Accessories								
Water flow monitor	500006623	500006623	500006623	500006623	500006623	500006623	500006623	500006623
Over-temperature protection switch	122 84	122 84	122 84	122 84	122 84	122 84	122 84	122 84
Astrotorus baffle	227 51	227 50	227 61	227 60	227 71	227 70	227 81	227 80
Right angle valve	504138V008	504138V002	504138V008	504138V002	504138V008	504138V002	504138V008	504138V002
Pump fluid [1]	see Catalog Part “Oils / Greases / Lubricants LEYBONOL”							

1) Oil must be purchased separately

Oil Booster OB 6000 to OB 18000



Oil Booster OB 6000 (left), OB 12000 (middle) and OB 18000 (right)

The design of the oil booster pumps from Leybold is well proven in industrial high vacuum applications. They excel above all through excellent vacuum performance data and are, owing to their rugged design a reliable component in many medium and high vacuum units.

The water cooled oil booster pump was developed in particular for applications in the rough and medium vacuum range. The pumps from the OB line from Leybold deliver when properly deployed, a maximum pumping speed at high gas throughputs.

Advantages for the User

- Very high pumping speed from a small sized pump
- Pump sizes 6000, 12,000 and 18,000 m^3 per hour
- Simple to operate
- Rugged and long life
- Selectable flange connections (OB 12,000 and 18,000 only)
- Small manageable amount of spare parts
- Pump components (e.g. heating elements, diffusion corpus, jet corpus) are similar for all OB sizes and can be exchanged easily
- Modern electronic pump monitoring (PLC controlled)
- High efficiency due to direct heating
- Optimized heating design for long oil change intervals

Typical Applications

- Vacuum Induction Melting (VIM) or Vacuum Induction Degassing (VID) of special alloys are utmost important process steps in the metallurgy.
- Depending on the required steel-quality, the required process pressure in such applications is particularly low.
- Secondary metallurgy processes are becoming more popular thanks to the greater demand for better steels e.g. in the automotive, construction and rail markets.

Supplied Equipment

The OB pumps are plug-and-play but are delivered without pump fluid.
The pump chamber is free of oil and has been cleaned.
The inside volume is evacuated. The high vacuum and forevacuum flanges are equipped with sealing and centering rings as well as shipping flanges.
Moreover, the electric circuit breaker box and the cooling water manifold have been installed for immediate connection.
The included Pt100 temperature sensor ensures safe oil temperature monitoring.
The installed overtemperature protection switch monitors and ensures safe operation of the pump.

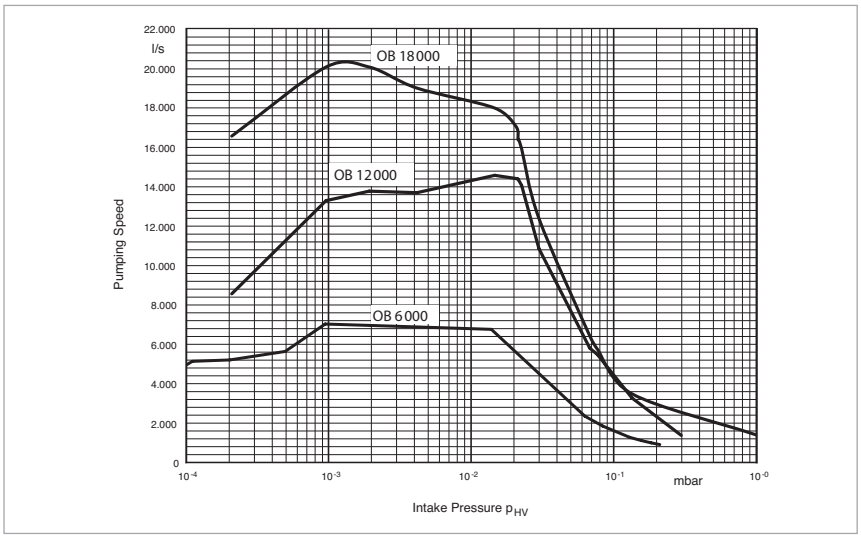
Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data

		Oil Booster OB 6000	Oil Booster OB 12000	Oil Booster OB 18000
Pumping speed for air below 1.0 x 10^{-3} mbar (7.5 x 10^{-3} Torr)	mbar x l/s	6.000	12.000	18.000
High vacuum connection				
standard	DN	400 ISO-K	630 ISO-F	630 ISO-F
optional	DN	400 ISO-K / ASA 16 / ASA 18	500 ISO-K / 800 ISO-F / ASA 16 / ASA 20	800 ISO-F / 1000 ISO-F / ASA 32 / ASA 35
Fore vacuum connection (standard)	DN	160 ISO-K	160 ISO-K	160 ISO-K
Operating range	mbar (Torr)	1 to 10^{-6} (0.75 to 10^{-6})	1 to 10^{-6} (0.75 to 10^{-6})	1 to 10^{-6} (0.75 to 10^{-6})
Ultimate total pressure	mbar (Torr)	5 x 10^{6} (< 3.75 x 10^{-6})	5 x 10^{6} (< 3.75 x 10^{-6})	5 x 10^{6} (< 3.75 x 10^{-6})
Pump fluid filling	l (qts)	45 (47.6)	60 (63.4)	90 (95.1)
Mains connection				
Standard EURO, 50/60 Hz	V	400 ~ 3 Ph Y	400 ~ 3 Ph Y	400 ~ 3 Ph Y
Standard Americas, 50/60 Hz	V	460 ~ 3 Ph Y	460 ~ 3 Ph Y	460 ~ 3 Ph Y
Special, 50/60 Hz	V	230 ~ 3 Ph Δ	230 ~ 3 Ph Δ	230 ~ 3 Ph Δ
Weight	kg (lbs)	450 (992)	850 (1874)	1400 (3086)
Cooling water				
consumption	l/h (gal/min)	700 (3.1)	800 (3.5)	1360 (6.0)
connection	G	1"	1"	1"

Ordering Information

	Oil Booster OB 6000	Oil Booster OB 12000	Oil Booster OB 18000
	Part No.	**Part No.**	**Part No.**
Oil diffusion pump			
Standard EURO	**503750V001**	**503654V001**	**503508V001**
Standard US	**503750V006**	**503654V006**	**503508V006**
with control unit			
EURO version	**503750V002**	**503654V002**	**503508V002**
US version	**503750V005**	**503654V005**	**503508V005**
with control unit and waterflow/ -temperature monitoring			
EURO version (400 V)	**503750V003**	**503654V003**	**503508V003**
US version (460 V)	**503750V004**	**503654V004**	**503508V004**
Pump fluid	see Catalog Part “Oils / Greases / Lubricants LEYBONOL”		



Pumping speed curves of the Oil Booster OB 6000 to OB 18000 as a function of the intake pressure

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

LEYBOJET 630
Water-Cooled

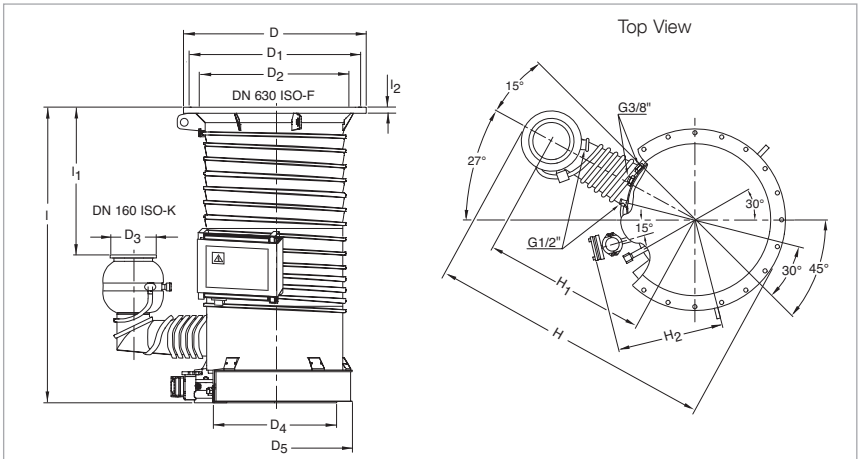


LEYBOJET 630

The oil diffusion pumps from Leybold are well proven in industrial high vacuum applications.

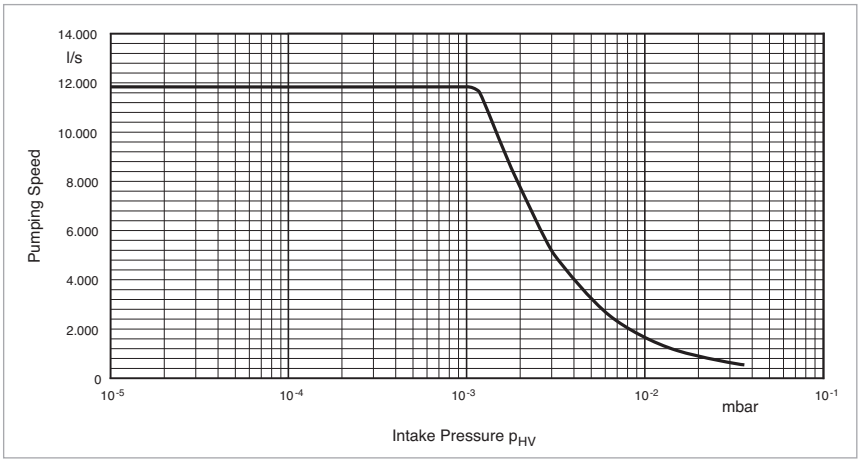
They excel through their excellent vacuum performance data and owing to their rugged design are a reliable component in many medium and high vacuum systems.

The water-cooled LEYBOJET 630 was developed especially with the medium vacuum in mind.



LEYBOJET 630		D	D_1	D_2	D_3	D_4	D_5	H	H_1	H_2
	mm	750	720	651	180	585	625	1144	650	423
	in.	29.53	28.35	25.63	7.09	23.03	24.61	45.04	25.60	16.65
		l	l_1	l_2						
	mm	1215	604	24						
	in.	47.83	23.78	094						

Dimensional drawing for the LEYBOJET 630



Pumping speed curve of the LEYBOJET 630 as a function of the intake pressure

Advantages for the User

- High and stable pumping speed well into medium vacuum range
- Low ultimate pressure
- Low oil backstreaming due to integrated water-cooled cold cap baffle
- High forevacuum tolerance
- Each heating cartridge is protected by a separate circuit breaker
- In maintaining the well proven heating system - heating insert with thermally conducting panels and heating cartridges - the LEYBOJET 630 is now equipped with an additional ejector nozzle for the purpose of obtaining a stable pumping speed well into the medium vacuum range

Typical Applications

The principal areas of application of the LEYBOJET 630 are modern sputtering processes as well as vacuum melting and drying plants.

Supplied Equipment

The LEYBOJET 630 are supplied ready for connection but without the filling of pump fluid.

The inside of the pump is cleaned before delivery to such an extent that it is free of oil. The inside is evacuated. High and forevacuum flanges are equipped with gaskets, centering rings, shipping flanges, and clamping components.

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data — LEYBOJET 630

High vacuum connection	DN	630 ISO-F
Forevacuum connection	DN	160 ISO-K
Pumping speed for air [1]		
at 1 x 10^{-2} mbar	l/s	1 700
at 1 x 10^{-3} mbar	l/s	12 000
< 1 x 10^{-4} mbar	l/s	12 000
Operating range	mbar (Torr)	< 10^{-2} (< 0.75 x 10^{-2})
Ultimate total pressure [1]	mbar (Torr)	< 5 x 10^{-7} (< 3.75 x 10^{-7})
Max. permissible forevacuum pressure	mbar (Torr)	6 x 10^{-1} (4.5 x 10^{-1})
Pump fluid filling, min. / max.	l (qts)	5.0 / 8.0 (5.3 / 8.5)
Mains connection 50/60 Hz	V	400, 3 Ph
Heating power	kW	10.8
Number of heating cartridges		9
Heating up time	min	< 30
Cooling water		
min. throughput [2]	l/h (gal/min)	500 (2.2)
connection	G	1/2"
Number of cooling circuits (including cold cap baffle)		2
Cooling water connection		
for pump	G (BPS)	1/2"
for cold cap baffle	G (BPS)	3/8"
Weight, approx.	kg (lbs)	145 (320)
Recommended backing pump [3]		
at operating pressures > 10^{-4} mbar (> 0.75 x 10^{-4} Torr)		SV 200 + W 501
at operating pressures < 10^{-4} mbar (< 0.75 x 10^{-4} Torr)		TRIVAC D 65 B + W 251

Ordering Information — LEYBOJET 630

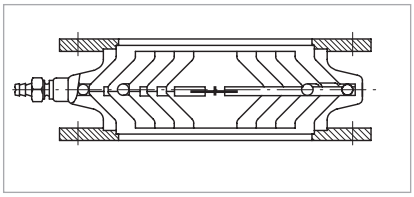
	Part No.
Oil diffusion pump LEYBOJET 630	**502 180**
Astrotorus baffle	**227 70**
Water flow monitor	**500006623**
Over-temperature protection switch	**122 84**
Contact thermometer	**218 81**
Resistance thermometer Pt100 sensor	**200 02 958**
Pump fluid [4]	see Catalog Part “Oils / Greases / Lubricants LEYBONOL”

[1] Measured to DIN 28 427 with **LEYBONOL LVO 500** as the pump fluid
[2] The required quantity of cooling water refers to ΔT = 10 °C (50 °F). The discharge temperature should not exceed 30 °C (86 °F)
[3] Single- or two-stage rotary vane vacuum pump (TRIVAC; SOGEVAC) from our range of forevacuum pumps jointly with Roots vacuum pumps (RUVAC) in pump systems
[4] Oil must be purchased separately

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

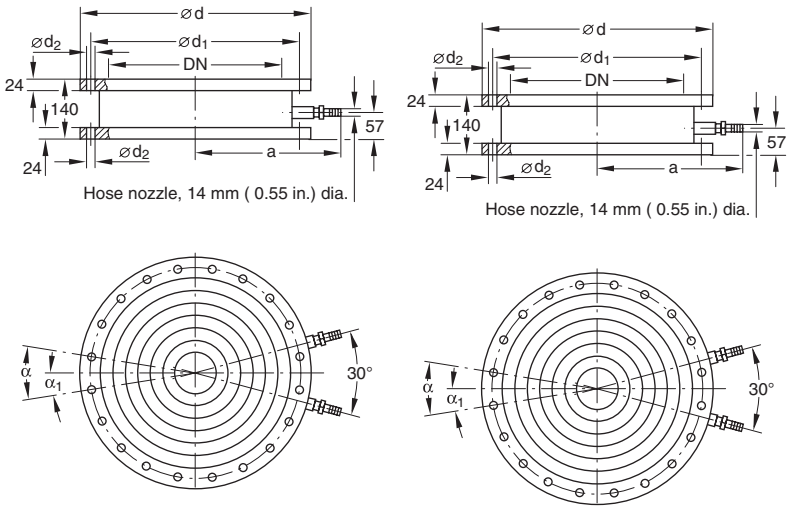
Accessories for Oil Diffusion Pumps

Astrotorus Baffles



Section through an astrotorus baffle

The cooling inserts of the astrotorus baffles are made of copper, whereas the housing and the connection flange are made of standard steel.



DN		a	b	⌀ d	⌀ d_1	⌀ d_2
250 ISO-K	mm	265	30	416	290	–
	in.	10.4	0.18	16.4	11.4	–
400 ISO-K	mm	362	120	512	450	–
	in.	14.25	4.72	20.2	17.7	–
500 ISO-K	mm	412	120	612	550	–
	in.	16.22	4.72	24.1	21.7	–
630 ISO-F	mm	440	–	750	720	14
	in.	17.32	–	29.53	28.35	0.55
800 ISO-F	mm	546	–	920	890	14
	in.	21.5	–	36.22	35.04	0.55
1000 ISO-F	mm	599	–	1120	1090	14
	in.	23.58	–	44.09	42.91	0.55

DN		Quantity	h	h_1	α	α_1
250 ISO-K	mm	–	195	97	–	–
	in.		7.68	3.82	–	–
400 ISO-K	mm	–	193	96	–	–
	in.		7.6	3.78	–	–
500 ISO-K	mm	–	193	96	–	–
	in.		7.6	3.78	–	–
630 ISO-F	mm	20	140	–	18°	9°
	in.	20	5.5	–	18°	9°
800 ISO-F	mm	24	140	–	15°	7,5°
	in.	24	5.5	–	15°	7,5°
1000 ISO-F	mm	32	140	–	11.25°	5.625°
	in.	32	5.5	–	11.25°	5.625°

Dimensional drawing for the astrotorus baffle ISO-K (left) and ISO-F (right)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data

Astrotorus Baffles

Connection to pump	DIP	3 000	8 000	12 000
HV connection flanges	DN	250 ISO-K	400 ISO-K	500 ISO-K
Throttling of the pumping speed, approx.	%	30	30	30
Conductance	l/s	3 000	9 000	12 000
Weight	kg (lbs)	25.0 (55.2)	30.0 (66.2)	65.0 (143.5)

Ordering Information

Astrotorus Baffles

	Part No.	Part No.	Part No.
Astrotorus baffle			
250 ISO-K	**227 50**	–	–
400 ISO-K	–	**227 60**	–
500 ISO-K	–	–	**227 65**

Technical Data

Astrotorus Baffles

Connection to pump	DIP	20 000	30 000	50 000
HV connection flanges	DN	630 ISO-F	800 ISO-F	1000 ISO-F
Throttling of the pumping speed, approx.	%	30	30	30
Conductance	l/s	18 000	28 000	50 000
Weight	kg (lbs)	120.0 (264.9)	170.0 (375.3)	190.0 (419.4)

Ordering Information

Astrotorus Baffles

	Part No.	Part No.	Part No.
Astrotorus baffle			
630 ISO-F	**227 70**	–	–
800 ISO-F	–	**227 75**	–
1000 ISO-F	–	–	**227 80**

For matching valves, please ask us for a quotation.

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Temperature dependant Switching Components for Automatic Pump System Control

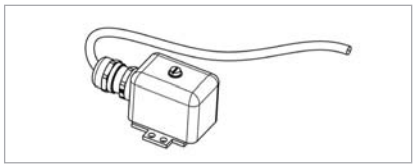
The operational status of the diffusion pump depends on the temperature of the pump fluid in the pump boiler. Through temperature dependent switching components which are inserted into the pump boiler it is possible to monitor the operational status of the diffusion pump and signal its status to a process controller.

For this, the diffusion pump requires two thresholds. Depending on the type of pump, the upper threshold should be between 180 and 200 °C (356 and 392 °F) and the lower threshold between 90 and 100 °C (194 and 212 °F).

The upper threshold indicates that the diffusion pump is ready for operation and thus actuates certain devices, for example opening of the high vacuum valve ahead of the diffusion pump.

The lower threshold indicates that the diffusion pump has cooled down to such an extent that the backing pump and the cooling water supply may be switched off.

Over-temperature protection switches are used to monitor the temperature of the cooling water in the cooling water circuit of the diffusion pumps. When the temperature rises to unacceptably high levels (for example when the cooling water supply fails) the heater in the diffusion pump is switched off (correct electrical connection to the main supply is required). The use of over-temperature protection switches avoids unnecessary alarms that may be triggered by contaminated water when only a water flow monitor is used. The over-temperature protection switch is screwed on to a contact plate which is soldered to the cooling pipe on the pump's body.

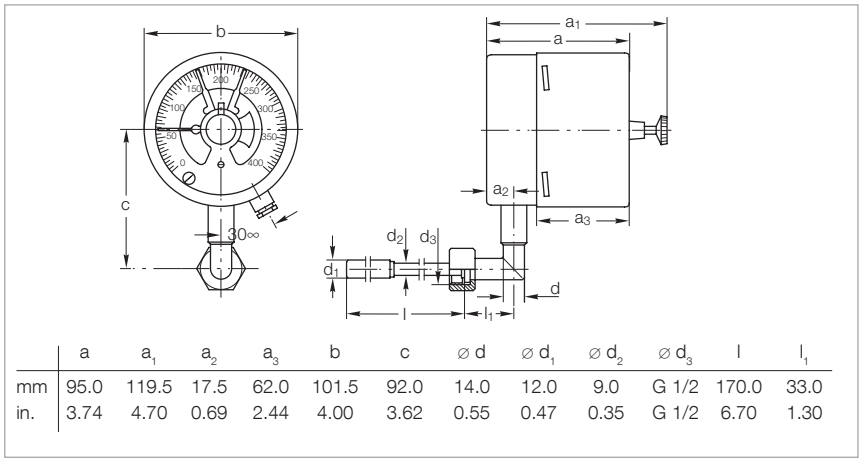


Over-temperature protection switch

Max. switching current: 5 A (230 V, 50/60 Hz).

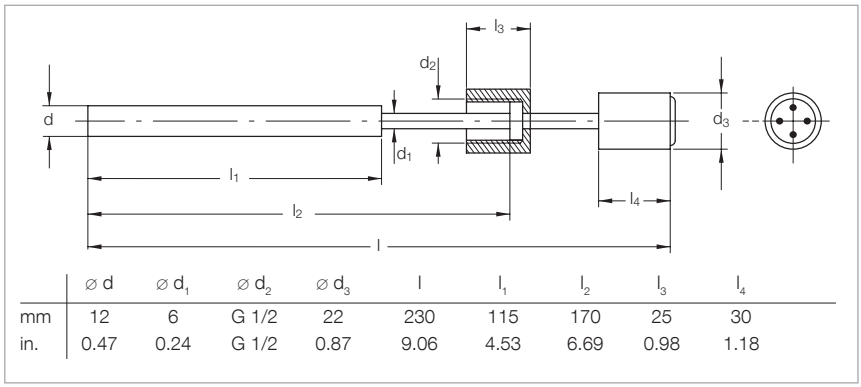
Contact thermometer with a range from 0 to 400 °C (32 to 752 °F). Through a trailing pointer two switching thresholds may be set up independently. The current oil temperature and the thresholds which have been set up can be read off at the location of the diffusion pump. The contacting thermometer is not suited for remote signaling of temperatures.

Resistance thermometer Pt100 sensor. The measurement range of this sensor depends on the temperature display unit used by the customer where also the required thresholds are set up. The Pt100 sensor is ideal for remote signaling of temperatures.



	a	a_1	a_2	a_3	b	c	⌀ d	⌀ d_1	⌀ d_2	⌀ d_3	l	l_1
mm	95.0	119.5	17.5	62.0	101.5	92.0	14.0	12.0	9.0	G 1/2	170.0	33.0
in.	3.74	4.70	0.69	2.44	4.00	3.62	0.55	0.47	0.35	G 1/2	6.70	1.30

Dimensional drawing for the contact thermometer



	⌀ d	⌀ d_1	⌀ d_2	⌀ d_3	l	l_1	l_2	l_3	l_4
mm	12	6	G 1/2	22	230	115	170	25	30
in.	0.47	0.24	G 1/2	0.87	9.06	4.53	6.69	0.98	1.18

Dimensional drawing for the resistance thermometer Pt100 sensor

Ordering Information

Monitoring Instruments

	Part No.
Over-temperature protection switch	**122 84**
Contact thermometer (Measurement range 0 to +400 °C (+32 to +752 °F), Rating at 220 V AC: 250 mA [resistive load], Weight: 1.7 kg (3.7 lbs))	**218 81**
Resistance thermometer Pt100 sensor	**200 02 958**

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Monitoring Instruments

Protection against Overheating

Water flow monitors are installed in the cooling water return section of the diffusion pump. When the cooling water throughput drops below a certain level, either the heater in the diffusion pump is switched off or a warning light or signal is triggered, depending of the type of circuit.

Measurement range: 1 to 40 l/min (0.2 to 10.6 gal/min)

The water throughput may be set within the limits stated with a high degree of reproducibility.

Water flow monitors may be installed in any orientation.
Max. switching capacity:
100 VA (230 V, 50/60 Hz).

Protection against Power Failure

A SECUVAC valve (see Product Section “Vacuum Valves”) must be installed in the forevacuum line in order to prevent damage to the diffusion pump or the pump fluid in the event of a power failure affecting backing pumps which are not equipped with an automatic isolation valve. Rotary vane vacuum pumps from the TRIVAC B series are equipped with an automatic Pressure relief valve (intake isolation valve) as standard.

Protection against Pressure Increases in the Forevacuum Line

For protection against a pressure increase in the forevacuum line which is not caused by a power failure you may use our vacuum gauges which offer an adjustable switching threshold (see Product Section “Vacuum - Measuring, Controlling”).

Ordering Information

Water Flow Monitor

	Part No.
Water flow monitor	**500006623**

Power Controller



Power controller with integrated USB interface



Ethernet interface for PLC data integration

When it comes to the aspect of economic and efficient operation of diffusion pumps, power consumption plays an important role.
Through our DIP power controller, you may now drastically cut your power consumption – and this without impairing pump performance in any way!

Leybold Solutions provides an unique energy control unit with less thermal loss to control the heating power to save energy significantly!

Advantages to the User

- Energy saving up to 30% (low costs and ROI in less than three years)
- Further potential savings through temperature decrease in standby-mode
- High quality regulation with customized software
- Increased operation safety and comfort
- Improved service life for oil and heating cartridges
- Easy and exact to operate via PLC or manual directly at the pump
- Uncomplicated integration of generated data into your own process control or export data via USB port
- Strategically process analysis and optimization by interpretation of energy control unit data

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data

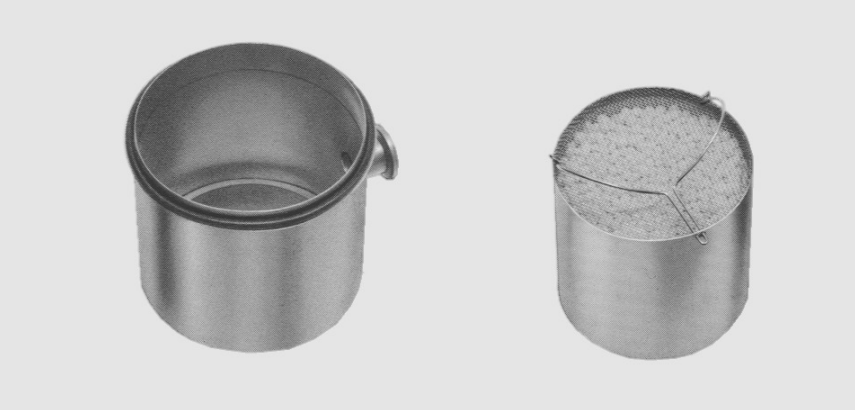
		Power Controller for DIP 20 000	Power Controller for DIP 30 000	Power Controller for DIP 50 000
Pumping speed for air below 1 x 10^{-4} mbar	l/s	20 000	30 000	50 000
Installed heating power	kW	12	18	24
Number of heating cartridges		2	6	9
Heating up time	min	< 25	< 30	< 30
Cooling water (minimum)				
for the pump	l/h	600	900	1500
for the cold cap baffle	l/h	80	80	150

Ordering Information

	Power Controller for DIP 20 000 Part No.	Power Controller for DIP 30 000 Part No.	Power Controller for DIP 50 000 Part No.
Oil diffusion pump with power controller			
DIP 20 000	**22230V001**	–	–
DIP 30 000	–	**22235V001**	–
DIP 50 000	–	–	**22240V001**
Retrofit kit (DIP power controller)			
DIP 20 000	**503647V001**	–	–
DIP 30 000	–	**503648V001**	–
DIP 50 000	–	–	**503649V001**
Full-service retrofit kit [1]			
DIP 20 000	**AS8100F**	–	–
DIP 30 000	–	**AS8101F**	–
DIP 50 000	–	–	**AS8102F**
Mineral oil LVO 500			
1 l	**L50001**	**L50001**	**L50001**
5 l	**L50005**	**L50005**	**L50005**
20 l	**L50020**	**L50020**	**L50020**
Mineral oil LVO 510			
1 l	**L51001**	**L51001**	**L51001**
5 l	**L51005**	**L51005**	**L51005**
Silicone oil LVO 520			
1 l	**L52001**	**L52001**	**L52001**
5 l	**L52005**	**L52005**	**L52005**
Silicone oil LVO 530			
1 l	**L53001**	**L53001**	**L53001**

[1] Delivery, installation, commissioning and instruction of the staff is included

Adsorption Traps with Aluminium Oxide Insert



Adsorption traps are installed in all those cases where an oil-free vacuum is to be produced with oil-sealed vacuum pumps.

Advantages to the User

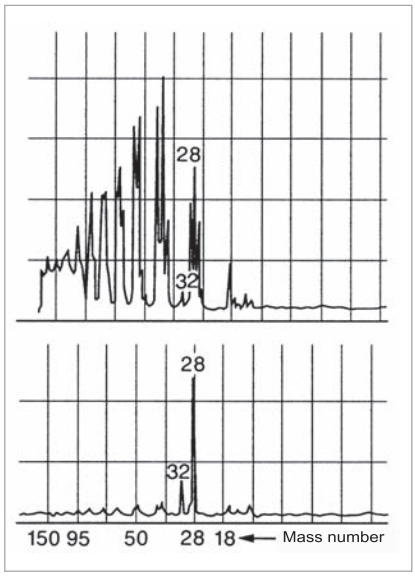
- Backstreaming of oil is reduced by 99%
- Long service life
- High conductance
- Filling can be easily exchanged
- Improvement in the ultimate pressure attained by backing pumps by one order of magnitude
- Stainless steel housing and insert
- NBR gasket

Typical Applications

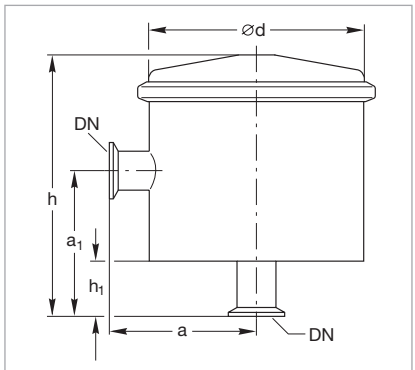
- Product of an oil-free vacuum

Supplied Equipment

- Complete with insert
- Without adsorbent



Residual gas spectrum; top ahead of a rotary vacuum pump, bottom ahead of a rotary vacuum pump with adsorption trap



DN		a	a_1	Ø d	h	h_1
16 ISO-KF	mm	82	82	135	147	32
	in.	3.23	3.23	5.31	5.79	1.25
25 ISO-KF	mm	102	102	175	155	33
	in.	4.02	4.02	6.89	6.10	1.26
40 ISO-KF	mm	132	65	235	160	20
	in.	5.19	2.56	9.25	6.3	0.79

Dimensional drawing for the adsorption traps

Technical Data

		Adsorption Traps		
		16 ISO-KF	25 ISO-KF	40 ISO-KF
Conductance at 10^{-2} mbar (Torr)	l/s	4.0	6.0	12.0
Service live with Al oxide	Months	3	3	3
Al oxide filling	l (qts)	0.5 (0.53)	1.0 (1.06)	2.0 (2.1)
Weight, approx.	kg (lbs)	1.3 (2.9)	1.3 (2.9)	4.0 (8.8)

Ordering Information

	Adsorption Traps		
	16 ISO-KF	25 ISO-KF	40 ISO-KF
	Part No.	Part No.	Part No.
Adsorption trap	**854 14**	**854 15**	**854 16**
Activated aluminum oxide in tin 1.6 l (approx. 1.2 kg (2.65 lbs))	**854 10**	**854 10**	**854 10**

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Notes

Right-Angle Valves, DN 250 ISO-K to DN 1000 ISO-F, Electropneumatically Operated

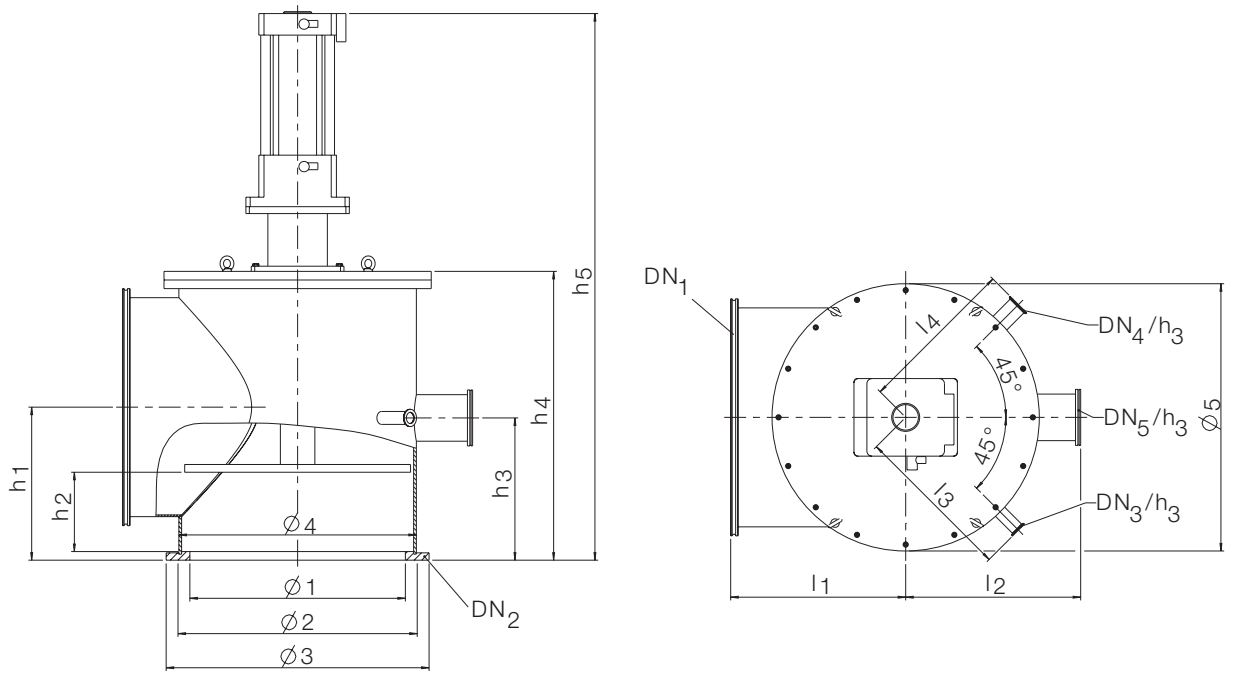


Electropneumatically actuated right-angle valves,stainless steel, DN 250 ISO-K

Electropneumatically actuated right-angle valves are used in automated vacuum systems which need to be controlled electrically.

Advantages to the User

- Pneumatic or electropneumatic opening
- Short opening and closing times
- Optical position indicator
- Electric position indicator
- With and without pilot valve IP 54
- Protection class IP 50
- The valves are closed by the restoring force of a spring
- Installation in any orientation and no restrictions as to the direction of flow



Nominal width (DN_1/DN_2)	DN_3	DN_4	DN_5	h_1	h_2	h_3	h_4	h_5	$ø_1$	$ø_2$	$ø_3$	$ø_4$	$ø_5$	l_1	l_2	l_3	l_4
DN 250 ISO-K	16 KF	40 KF	63 ISO-K	211	83	211	392	565	262	-	290	292	330	208	206	206	206
DN 320 ISO-K	16 KF	40 KF	63 ISO-K	208	107	208	433	934	318	395	425	398,5	470	279	279	258	258
DN 400 ISO-K	25 KF	40 KF	63 ISO-K	246	148	220	538	1045,5	400	480	510	450	510	350	325	300	300
DN 500 ISO-K	25 KF	40 KF	100 ISO-K	355	184	330	670	1268	500	580	610	551	620	406	406	370	370
DN 630 ISO-K	25 KF	40 KF	160 ISO-K	403	233	355	821	1469	630	720	750	690	759	537	470	436	436
DN 800 ISO-F	25 KF	40 KF	250 ISO-K	491	267	440	1002	1668	800	890	920	899	990	595	533	505	505
DN 1000 ISO-F	25 KF	40 KF	250 ISO-K	592	333	542	1206	2133	1000	1090	1120	1110	1220	700	635	603	603

Dimensional drawing (all dimensions in mm)

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data	DN 250 ISO-K	DN 320 ISO-K	DN 400 ISO-K	DN 500 ISO-K	DN 630 ISO-K	DN 800 ISO-F – F	DN1000 ISO-F
Installation orientation	vertical / pneumatic Cylinder at the top						
Conductance	4,000	6,000	9,000	12,000	20,000	30,000	50,000
Weight (kg)	51	110	150	190	270	350	450
Drive pneumatic	(opening and closing)						
Pressure difference when opening	Max. 200 mbar						
Opening time [2] (sec)	2	3	5	5	6	8	8
Closing time [2] (sec)	2	3	5	5	6	8	8
Service life (actuations)	> 1 x 10^5	> 1 x 10^5	> 1 x 10^5	> 1 x 10^5	> 1 x 10^5	> 5 x 10^4	> 5 x 10^4
Helium leak rate	< 1 x 10^{-7} mbar l/s						
Pressure range	1 x 10^{-7} mbar to atmospheric pressure						
Max operating temp.	60 °C						
Connecting flange [1]	DN 250 ISO-K – K	DN 320 ISO-K – F	DN 400 ISO-K – F	DN 500 ISO-K – F	DN 630 ISO-K – F	DN 800 ISO-F – F	DN1000 ISO-F – F
Bypass Flange	63 ISO-K	63 ISO-K	63 ISO-K	100 ISO-K	160 ISO-K	250 ISO-K	250 ISO-K
Further Flanges	NW40 NW16	NW40 NW16	NW40 NW25	NW40 NW25	NW40 NW25	NW40 NW25	NW40 NW25
Materials							
Housing and disk	Stainless steel 1.4301						
Seals	FKM						
Sealing bellows	Stainless steel 1.4373						
Pilot valve							
Nominal voltage	24 V DC						
Nom. power consumption	4,5 W						
Duty ratio	100 %						
End position switch (max. contact ratings)							
Nominal voltage	5 – 240 V AC/DC						
Current	100 mA						
Power consumption	10 W						
Compressed air supply							
Air connection	¼" NPT						
Pressure range	5 – 7 bar						

1) per flange,12 clamping screws are needed for mounting (Part No. 267 10)

2) under vacuum, differential pressure Δp = 0 and compressed air = 6 bar (overpressure)

Ordering Information	DN 250 ISO-K	DN 320 ISO-K	DN 400 ISO-K	DN 500 ISO-K	DN 630 ISO-K	DN 800 ISO-F – F	DN1000 ISO-F
	Part. No.	Part. No.	Part. No.	Part. No.	Part. No.	Part. No.	Part. No.
Right-angle Valve, electropneumatic drive	504137V002	504138V002	504139V002	504140V002	504141V002	504142V002	504143V002
Seal kit with bellows	EK121870-00	EK121871-00	EK121872-00	EK121873-00	EK121874-00	EK121875-00	EK121876-00
Seal kit without bellows	EK121870-01	EK121871-01	EK121872-01	EK121873-01	EK121874-01	EK121875-01	EK121876-01
Electronics-solenoid and position indicators	EK121870-02	EK121871-02	EK121872-02	EK121873-02	EK121874-02	EK121875-02	EK121876-02

More valves please find in the catalog part "Valves"

Applications and Accessories, Cryo Pumps

Cryo pumps	COOLVAC 1500	COOLVAC 2000	COOLVAC 3000	COOLVAC 5000	COOLVAC 10000	COOLVAC 18000	COOLVAC 30000	COOLVAC 60000	COOLVAC 30000 LN_2	COOLVAC 60000 LN_2
Application										
General research	■	■	■	■	■	■	■	■	■	■
Evaporation coating systems	■	■	■	■	■	■	■	■		
Transfer chambers / Loadlock	■	■	■	■	■	■				
Metallization systems	■	■	■	■	■	■	■	■		
Sputtering systems	■	■	■	■	■					
Ion implanters	■	■	■	■						
Electron beam welding systems	■	■	■	■	■	■				
Space simulation chambers	■	■	■	■	■	■	■	■	■	■
UHV systems	■	■	■							
Beam tubes in particle accelerators	■	■								
Vacuum furnaces				■	■	■	■	■	■	■
Model versions										
BasicLine Version without electronics, with temperature sensors	■	■	■	■	■	■	■	■		
iClassicLine version with electronics and integrated controller, with temperature sensors and electrical heaters	■	■	■	■	■	■	■	■		
BasicLine LN_2 version with liquid nitrogen cooling, temperature sensors and electrical heaters and over-temperature protection									■	■
Accessories										
Purge gas option, on request	■	■	■	■	■					
Compressor unit COOLPAK 2000 Series	■	■	■							
Compressor unit COOLPAK 6000 Series	[■]	[■]	[■]	■	■	■	■	■	■	■
Flexible pressure lines	■	■	■	■	■	■	■	■	■	■
Gas manifold GD 2 for multiple operation of up to two cryo pumps	■	■	■	■ *)	■ *)					
Gas manifold GD 4 for multiple operation of up to four cryo pumps	■	■	■							
Low temperature measuring instrument MODEL 211 S (BasicLine Series only)	■	■	■	■	■	■	■	■	■	■

[■] = For dual and multiple operation only *) Multiple operation only after consultation with technical support

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Applications and Accessories, Cryogenics

Cold heads / Application	single-stage: COOLPOWER 50	COOLPOWER 140 T	COOLPOWER 250 MD	double-stage: COOLPOWER 7/25	COOLPOWER 5/100	COOLPOWER 10 MD
Cooling of samples, sensors and detectors	■	■	■	■	■	■
Cooling of detectors in astronomy	■	■	■	■	■	■
Cooling of samples for spectroscopy				■	■	■
Cooling of samples for applications in medical technology and R&D				■	■	■
Cooling of HTS superconductors	■	■	■	■	■	■
Cooling of LTS superconductors				(■)	(■)	(■)
Cooling in medical equipment	■	■	■	■	■	■
Cooling of surfaces for pumping of gases	■	■	■	■	■	■
Cryogenic process gas cleaning	■	■	■	■	■	■
Condensation, resublimation and freezing of gases	■	■	■	■	■	■

(■) = Only LTS superconductors with T_c > 10 K

Accessories

Compressor unit COOLPAK 2000 Series	■			■		
Compressor unit COOLPAK 6000 Series	(■)	■	■	(■)	■	■
Low temperature measurement instrument MODEL 211S	■	■	■	■	■	■
Temperature sensor	■	■	■	■	■	■

(■) = Only high T_c superconductors

Conversion of Units

Kelvin (K), Celsius (°C), Fahrenheit (°F)

Calculation from	Calculation to	Formula
Celsius	Fahrenheit	°F = °C x 1.8 + 32
Celsius	Kelvin	K = °C + 273.15
Kelvin	Celsius	°C = K – 273.15
Kelvin	Fahrenheit	°F = K x 1.8 – 459.67
Fahrenheit	Celsius	°C = (°F – 32) / 1.8
Fahrenheit	Kelvin	K = (°F + 459.67) / 1.8

The following applies to absolute zero:
0 K = –273.15 °C = –459.67 °F.

Cryo Pumps

Cryo pumps are gas entrapment vacuum pumps for the pressure range from 10^{-3} to ≤ 10^{-11} mbar (0.75 x 10^{-3} to ≤ 0.75 x 10^{-11} Torr). The principle of operation is that gaseous substances are bound to the cold surfaces within the pump by means of cryocondensation, cryosorption or cryotrapping.

In order to be able to produce a high or ultra-high vacuum, the cold surfaces (cryopanels) must be cooled to a sufficiently low temperature. Depending on the type of cooling system used a distinction is made between refrigerator cryo pumps, bath cryo pumps and evaporator cryo pumps.

Leybold manufactures refrigerator-cooled cryo pumps as well as liquid nitrogen supported cryo pumps.

Advantages to the User

Advantages offered by the pumping principle

- High effective pumping speed for all gases
- Extremely high pumping speed for H_2O (water) and H_2 (hydrogen)

For a given diameter of the high vacuum flange, the cryopump offers the highest pumping speed of all high vacuum pumps.

Advantages offered by Design

In contrast to gas transfer high vacuum pumps, cryo pumps do not have any mechanically moving, oil or grease lubricated parts on the vacuum side.

The following advantages are a direct result of this design characteristic:

- Hydrocarbon-free vacuum in the pressure range from 10^{-3} to ≤ 10^{-11} mbar (0.75 x 10^{-3} to ≤ 0.75 x 10^{-11} Torr).
- Insensitivity to mechanical disturbances from particles coming from the process or external vibrations.

Further Advantages

- More compact than comparable pump systems offering a pumping speed of over 1500 l/s
- Backing pump is only required during start-up and during regeneration
- User friendly process control and pump control
- Favorable price-performance ratio and low running costs especially at higher pumping speeds

The cryo pumps are cooled by the well-proven two-stage refrigerators from Leybold's COOLPOWER line (Gifford/McMahon principle).

The design of a refrigerator cryopump from the COOLVAC range is shown schematically in the figure below.

The first stage of the cold head **(6)** cools the thermal radiation shield **(7)** and the baffle **(8)** of the pump.

Both are made of copper with high thermal conductivity in order to optimally utilize the available refrigerating capacity.

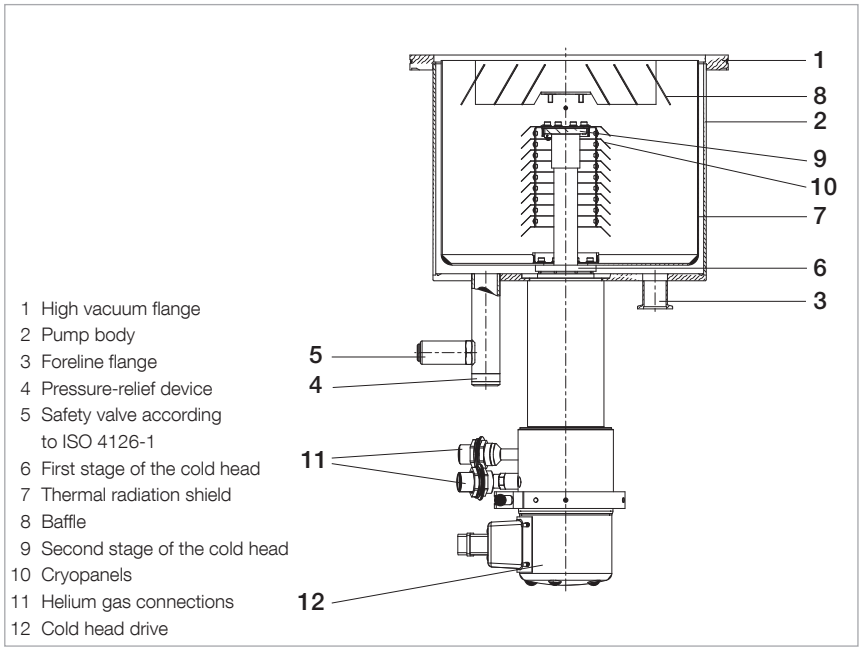
Operating temperatures of 45 K to 80 K are reached depending on the type of pump and on the operating conditions. Mainly water but also carbon oxides are pumped here.

The second stage of the cold head **(9)** is used to cool the cryopanels **(10)**. These pumping surfaces are also made of copper of high thermal conductivity and they are tightly linked thermally to the second stage of the cold head.

Depending on the operating conditions, operating temperatures of 10 to 20 K are attained.

Here the process of cryocondensation of N_2 (nitrogen), O_2 (oxygen) and Ar (argon) will take place.

The inner part ot the pumping surfaces are additionally covered with activated charcoal. Here the process of adsorption (cryosorption) of H_2 (hydrogen), Ne (neon) and He (helium) will take place.



COOLVAC refrigerator cryopump

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

All cryo pumps from the COOLVAC range are equipped with all safety related components, particularly with a pressure-relief device and safety valve with flange hub **(4, 5)** which is equipped with an additional DN 40 KF flange for connection of an exhaust line.

The pump's body is made of high-quality stainless steel.

Helium compressors from the COOLPAK range are required for operating the COOLPOWER cold heads, which are incorporated within the COOLVAC range of cryo pumps.

Regenerating Cryo Pumps

An important aspect of the operation of cryo pumps is that of regeneration. Since a cryo pump is a gas entrapment pump, the pumped gases must be removed from the pump before the capacity limit is exceeded.
The so-called "regeneration" occurs by switching off the compressor unit and heating up the cold surfaces to room temperature. The pumped gases are pumped out by means of a roughing pump. As soon as the vacuum pressure is low enough, the cryo pump can be cooled down again. Finally, when the operating temperature has been reached, the regeneration process is complete.

Various procedures are available for regeneration as listed below:

- Heating up through self-heating after the refrigerator has been switched off, and subsequent re-cooling
- Heating up with the support of a dry, warm inert gas
- Heating up by means of an electrical heater on the cold surfaces.

These methods can be combined with each other.

iClassicLine Cryo pumps with regulated regeneration system

The cryo pumps from the *iClassicLine (iCL)* range are gradually heated up to room temperature by means of electrical heaters at both cold head stages. Pressure, temperature and heating power are monitored in detail within the cryo pumps.

During the process the pumped gases are released one after the other in the following sequence:

- Gases adsorbed at the cryopanels (e.g. hydrogen, helium, neon),
- Gases condensed at the cryopanels (e.g. nitrogen, oxygen, argon),
- Gases and vapors which have condensed on to the baffle and thermal radiation shield (e.g. water vapor).

The benefit of Leybold's regeneration process described above is that no additional purge gas is required during the regeneration of inert, unreactive gases.

Our application support team is on hand to answer any safety questions you may have in relation to client-specific process gases.

The accessories required for automatic regeneration, such as temperature sensors on both cold head stages, pressure gauge head, fore-vacuum valve and electrical controller are an integral part of the cryo pump in the iClassicLine range. Additional accessories can be supplied on request.

BasicLine cryo pumps with no regulated regeneration system

In the case of cryo pumps from the *BasicLine (BL)* range, regeneration takes place manually in two sub-steps:

- Switching off the refrigerator system and waiting until room temperature is reached. (The temperature can be read off by the customer from the built-in silicon diode).
- Re-cooling after a sufficiently low pressure is reached in the cryo pump.

Additional components such as temperature display unit, pressure gauge head and fore-vacuum valve are not part of the standard scope of delivery for BasicLine cryo pumps, although they are available as accessories on request. Leybold will be pleased to advise you on the optimum component configuration for your application.

The cryo pumps from both the *BasicLine* range as well as those from the *iClassicLine* range are available in suction capacity classes from 1500 l/s to 60000 l/s.

Multiple Operation of Refrigerator Cryo Pumps

The powerful Leybold compressor units COOLPAK 6000 H open up the possibility of operating up to three refrigerator cryo pumps simultaneously.

Advantages to the User

- Significantly reduced investment and operating costs
- Small footprint

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Cold Heads

A refrigerator is a cooling machine which operates on the basis of a thermodynamic cycle (Carnot) to produce cryogenic temperatures ($T \leq 120$ K).

Refrigerators operating according to the Gifford/McMahon principle have succeeded over other methods of cooling cryo pumps and cryogenic applications. Exclusively such coolers are produced and used by Leybold.

The cold heads consist essentially of three modules:

- Drive module
- Displacement unit
- Cold head stage(s)

Helium compressors from the COOLPAK range are used to drive the cold heads from the COOLPOWER range.

In addition to the standard products, Leybold also offers these cold heads, as well as cryo pumps, in custom designs in accordance with customer requirements.

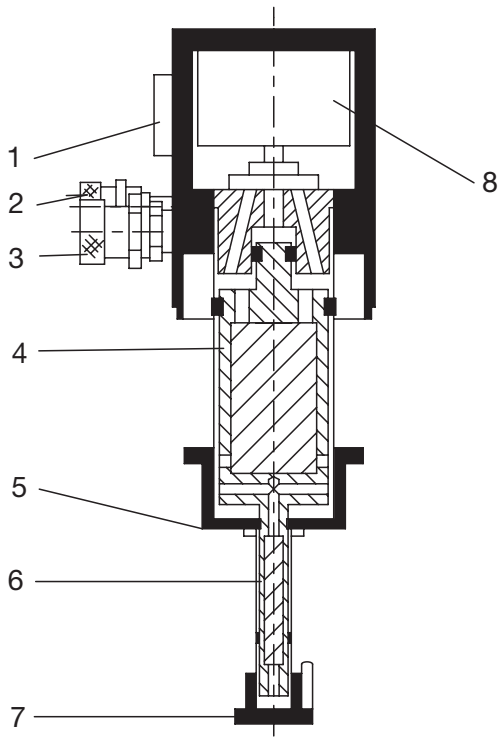
Gifford/McMahon-Refrigerators

Advantages to the User

- No liquid helium and no liquid nitrogen are required
- Very simple to operate
- Easy process control and temperature control via a computer
- No space problems since cold head and compressor unit can be installed and operated apart
- Installation of the cold head basically in any orientation
- High reliability
- Long periods of operation without maintenance

Typical Applications

- Cooling of
  - cryopanels in cryo pumps thereby producing high or ultra-high vacuum
  - superconducting magnets; for instance in magnetic resonance tomography
  - samples for spectroscopic analysis in solid state and surface physics
  - high-temperature and low-temperature superconductors
  - semiconductors
  - infrared and gamma detectors
- Recondensation of liquids and cleaning of gases
- Calibration of sensors



1 Electrical connection and current lead-through for cold head motor
2 Helium high pressure connection
3 Helium low pressure connection
4 Displacement piston, 1st stage
5 1st (refrigerator) stage (T_{end} > 20 K)
6 Displacement piston, 2nd stage
7 2nd (refrigerator) stage (T_{end} < 20 K)
8 Cold head motor

Dual-stage Gifford/McMahon cold head (schematic diagram)

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Cold heads from the COOLPOWER range

The standard range of single-stage and double-stage cold heads matches a wide range of applications.

Leybold is offering refrigerators with usable refrigerating powers from 20 W to 250 W at 80 K (single-stage).

In two-stage systems, the refrigeration capacities of the second stage range in between 5 W and 20 W at 20 K.

Pneumatically driven cold heads

Advantages

- **Simple Design**
  The pneumatic drive system for the displacer of these cold heads from Leybold consists of only two mechanically moving components: the rotating control valve and the synchronous motor driving the control valve.
- **Easy and quick maintenance**
  Owing to the simple design of the built-in cold heads, maintenance is easy. Maintenance can be performed in place without detaching the cold head from the vacuum chamber.

Mechanically driven cold heads

Advantages through low vibrations

With these cold heads, movement of the displacer unit is automatically controlled via a crank drive, which leads to low vibration levels.

Here, too, maintenance at the place of use can be carried out without impacting the surrounding infrastructure, in particular with no breaking of the chamber's vacuum by the service personnel.

Advantages through high reliability

Leybold cold heads are used in applications which place particularly high demands on reliability, such as magnetic resonance imaging in medical technology, the cooling of low and high temperature superconductors, and the cooling of detectors in telescopes for astronomy.

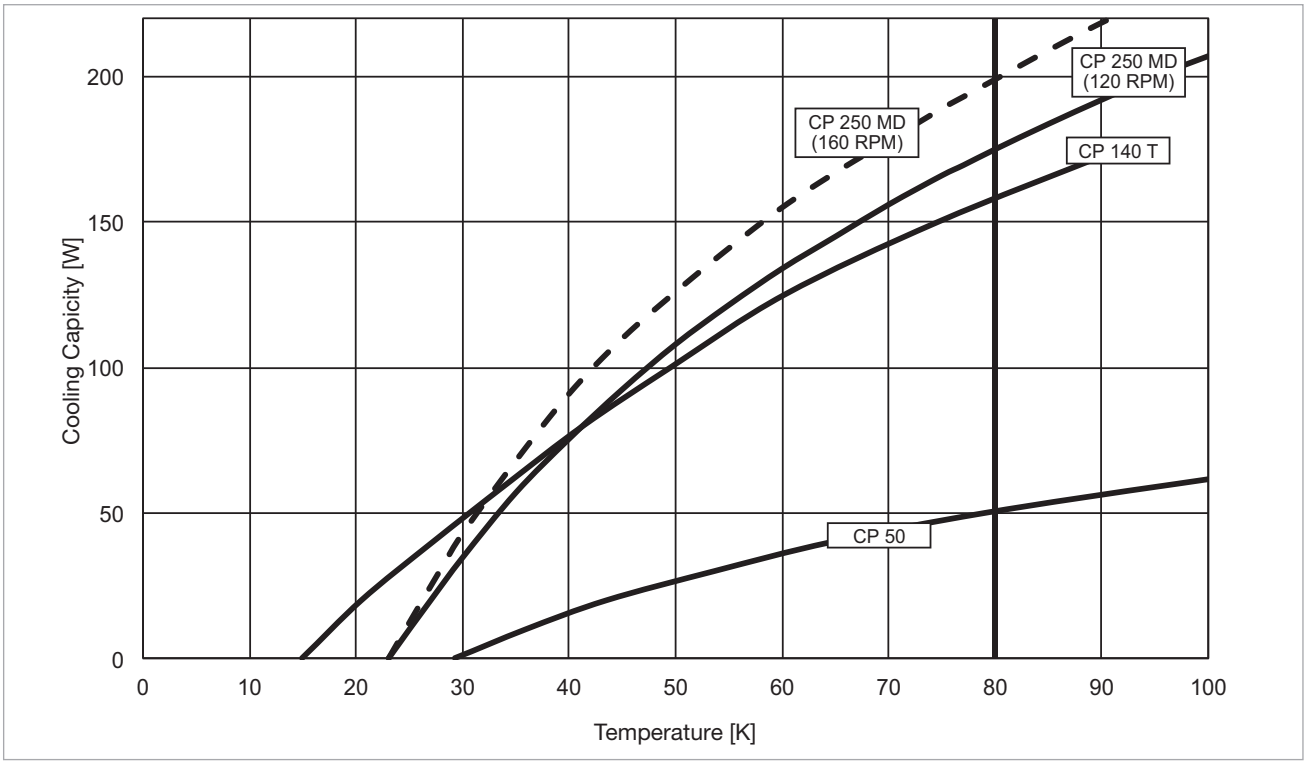
Refrigeration capacity diagrams (see next page of the catalogue)

On the following page of the catalogue you will find the refrigeration capacity diagrams for our single-stage and double-stage COOLPOWER cold heads.

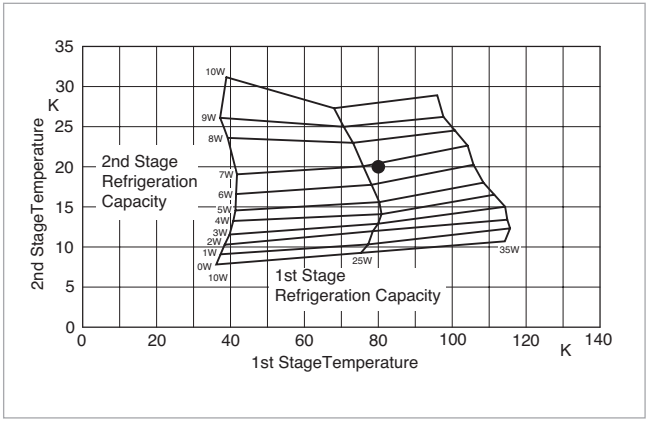
The interpretation of the diagrams for our double-stage cold heads is explained using the example of the refrigerator cold head COOLPOWER 5/100 (see diagram on next page).
If applying heat loads of 100 W on the 1st stage and of 6 W on the 2nd stage, simultaneously, then the intersection point (●) 100 W / 6 W of the two lines gives the expected 1st stage and 2nd stage temperature of 80 K and of 20 K, respectively.

Without thermal load (left lower intersection point (○) 0 W / 0 W of this "load map"), ultimate temperatures of < 30 K and of < 10 K will be reached on the 1st stage and on the 2nd stage, respectively.

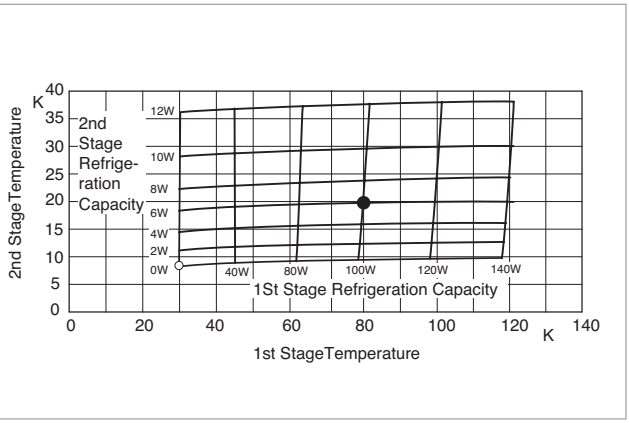
Refrigerating Capacity of Cryogenic Cold Heads



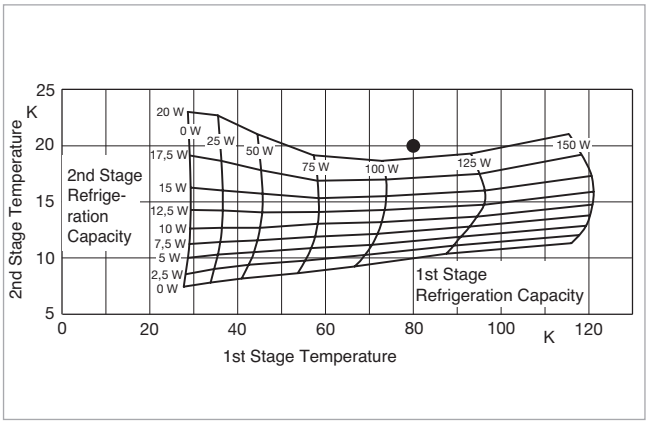
Typical refrigerating capacity of the single-stage cold heads COOLPOWER 50, COOLPOWER 140 T and COOLpower 250 MD



Typical refrigerating capacity of the cold head COOLPOWER 7/25



Typical refrigerating capacity of the cold head COOLPOWER 5/100



Typical refrigerating capacity of the cold head COOLPOWER 10 MD

The refrigerating capacities stated apply to vertical operation with the cold end at the bottom.

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Compressor Units

COOLPAK 2000 and COOLPAK 6000 H compressors are available for single and multiple operation of the cold heads from the COOLPOWER line as well as for operation of cryo pumps from the COOLVAC line.

The compressors are characterised by high reliability and ease of maintenance. The maintenance interval is as long as 30,000 hours depending on the application. The low level of noise and vibration is achieved through the exclusive use of scroll compressors and specially selected components.

The possibilities for single and multiple operation of refrigerator cryo pumps are given in the table below:

	For the operation of	
Compressor Unit	**Cold Heads**	**Cryo Pumps**
COOLPAK 2000/2200	1 x COOLPOWER 50 1 x COOLPOWER 7/25	1 x COOLVAC 1500 / 2000 / 3000
COOLPAK 6000 HD	2 x COOLPOWER 50 2 x COOLPOWER 7/25	2 x COOLVAC 1500 BL / 2000 BL / 3000 BL 2 x COOLVAC 5000 BL / 10000 BL *)
COOLPAK 6000 H/6200 H	1 x COOLPOWER 140 T 1 x COOLPOWER 5/100	up to 3 x COOLVAC 1500 iCL / 2000 iCL up to 2 x COOLVAC 3000 iCL up to 2 x COOLVAC 5000 iCL / 10000 iCL *) 1 x COOLVAC 5000 BL / 10000 BL
COOLPAK 6000 HMD/6200 HMD	1 x COOLPOWER 250 MD 1 x COOLPOWER 10 MD	1 x COOLVAC 30000 BL LN_2 1 x COOLVAC 60000 BL LN_2

*) only after consulting with our technical support

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Cryo Pumps with fully Automatic Control, iClassicLine
COOLVAC 1500 iCL

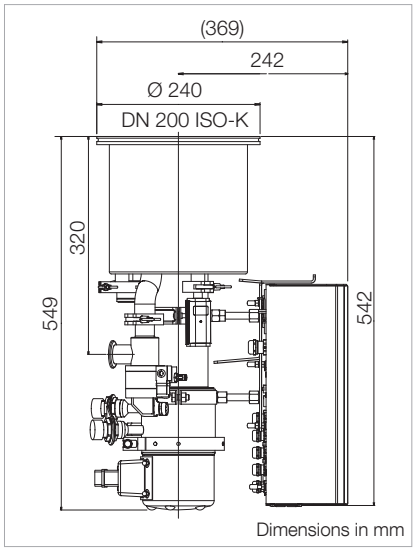


Advantages to the User

- Hydrocarbon-free high vacuum
- High capacity for argon and hydrogen
- High crossover value
- Simple operation
- Trouble-free integration into complex systems
- Fully automatic regeneration through Cryo Compact Control [1)]
- Easy servicing

Typical Applications

- Evaporators
- Sputtering systems
- Ion implanters
- Optical coating systems
- Metallization systems



Dimensional drawing for the COOLVAC 1500 iCL (DN 200 ISO-K)

Technical Data		COOLVAC 1500 iCL
High vacuum (HV) flange	DN	200 ISO-K / 200 CF / 6" ANSI
Fore vacuum flange [2)]	DN	25 ISO-KF
Flange for connection a gauge head [3)]	DN	16 ISO-KF
Flange for the electrical connection	DN	16 ISO-KF
Pressure-relief device with flange connection for gas exhaust line	DN	40 ISO-KF
4-way current feedthrough for Si diode on a flange	DN	16 ISO-KF
Heaters		
1st stage	W	160
	V AC	42
2nd stage	W	90
	V AC	42
Temperature sensor		
1st stage		PT 100
2nd stage		Si-Diode
Built-in cold head	COOLPOWER	7/25
Weight	kg (lbs)	25 (55.1)
Cooldown time to T_2 = 20 K	min	60
Crossover value	mbar x l (Torr x l)	210 (155)
Pumping speed		
H_2O	l/s	4600 ± 10%
Ar / N_2	l/s	1200 / 1500 ± 10%
H_2	l/s	2500 ± 10%
Capacity		
Ar / N_2	bar x l	1000 / 1000
H_2 at 10^{-6} mbar	bar x l	15 [4)]
Max. throughput		
Ar / N_2	mbar x l/s (Torr x l/s)	12 (9) / 12 (9)
H_2	mbar x l/s (Torr x l/s)	6 (4.5) [4)]
Helium connections (Self-sealing couplings: outside thread, type 5400-S2-8)	DN	1/2"

1) Accessories, necessary for automatic operations (i.e. electrical regeneration heaters, forevacuum valve DN 25 ISO-KF, and vacuum gauge DN 16 ISO-KF), are included with the scope of delivery and are connected to the integrated COOL.DRIVE.
2) Electropneumatic angle valve included.
3) Vacuum gauge head included.
4) The maximum throughput values given for hydrogen (H_2) are true for regenerated cryo pumps under short-term loads only. For continuous operations, both throughput and capacity values will be lower.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Ordering Information

COOLVAC 1500 iCL

	Single Operation		Dual operation		Multiple operation	
	Europe	USA/Japan	High Voltage	Low Voltage	High Voltage	Low Voltage
	Part No.		Part No.		Part No.	
COOLVAC 1500 iCL						
DN 200 CF	844201V0002		844201V0002 (2x)		844201V0002 (3x)	
DN 6" ANSI	844201V0004		844201V0004 (2x)		844201V0004 (3x)	
DN 200 ISO-K	844201V0006		844201V0006 (2x)		844201V0006 (3x)	
Compressors, flexlines and cables						
Compressor						
CP 2000	840000V2000	–	–	–	–	–
CP 2200	–	840000V2200	–	–	–	–
CP 6000 H	–	–	840000V6001	–	840000V6001	–
CP 6200 H	–	–	–	840000V6201	–	840000V6201
Power supply cable for compressor	–		see Ordering Information of the compressor units			
Set of flexlines						
FL 4.5 (1/2", 1/2")	892 87		892 87 (2x)		892 87 (3x)	
or FL 9.0 (1/2", 1/2")	892 88		892 88 (2x)		892 88 (3x)	
or FL 18.0 HP (1/2") + FL 18.0 LP (1/2")	840203 + 840204		840203 (2x) + 840204 (2 x)		840203 (3x) + 840204 (3 x)	
Gas manifold (1 piece each)						
GD 2	–		840 253 (2x)		–	
GD 4	–		–		840 254 (2x)	
Compressor unit control cable [1]						
COOLPAK control cable, 5 m (16.4 ft)	844231V4005		844231V4005 (2x)		844231V4005 (3x)	
or COOLPAK control cable, 10 m (32.81 ft)	844231V4010		844231V4010 (2x)		844231V4010 (3x)	
or COOLPAK control cable, 20 m (65.62 ft)	844231V4020		844231V4020 (2x)		844231V4020 (3x)	
COOLPAK adapter for multi control	–		844231V5003		844231V5003	
Optional electronics, cables and equipment						
CRYOVISION control and display unit	844231V0002		844231V0002		844231V0002	
CRYOVISION control cables						
CRYOVISION control cable, 5 m (16.4 ft)	844231V2005		844231V2005		844231V2005	
or CRYOVISION control cable, 10 m (32.81 ft)	844231V2010		844231V2010		844231V2010	
or CRYOVISION control cable, 20 m (65.62 ft)	844231V2020		844231V2020		844231V2020	
Network control cable for the link between the pumps						
CRYOVISION / Network control cable, 5 m (16.4 ft)	–		844231V2005		844231V2005 (2x)	
or CRYOVISION / Network control cable, 10 m (32.81 ft)	–		844231V2010		844231V2010 (2x)	
or CRYOVISION / Network control cable, 20 m (65.62 ft)	–		844231V2020		844231V2020 (2x)	
Optional interface module						
COOLVAC ProfiBus module ProfiBus – RS232 Converter for COOL.DRIVE and CRYOVISION either COOLVAC ProfiBus module connected to COOL.DRIVE control and monitoring unit of each cryo pump (in this case CRYOVISION and network control not to apply)	844000V1		844000V1 (2x)		844000V1 (3x)	
or COOLVAC ProfiBus module connected to CRYOVISION [2]	844000V1		844000V1		844000V1	

The arrangement of the components is shown in the chapter “Accessories” under the heading “iCOOLVAC iClassicLine, System Components”.

1) The length of the control cable should match to the length of the flexlines.
2) At multiple operation with reduced communication speed to single cryo pumps.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

COOLVAC 2000 iCL

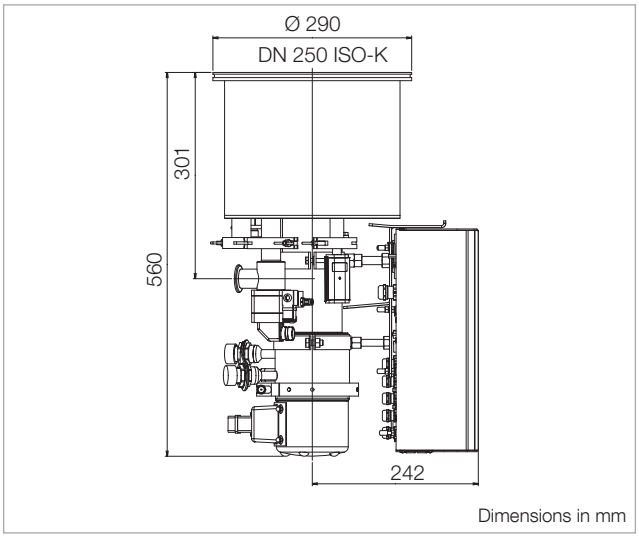


Advantages to the User

- Hydrocarbon-free high vacuum
- High capacity for argon and hydrogen
- High crossover value
- Simple operation
- Trouble-free integration into complex systems
- Fully automatic regeneration through integrated COOL.DRIVE controller [1)]
- Easy on-site servicing without pump disassembling and reconditioning of the vacuum system possible

Typical Applications

- Evaporators
- Sputtering systems
- Ion implanters
- Optical coating systems
- Metallization systems



Dimensional drawing for the COOLVAC 2000 iCL (DN 250 ISO-K)

COOLVAC 3000 iCL

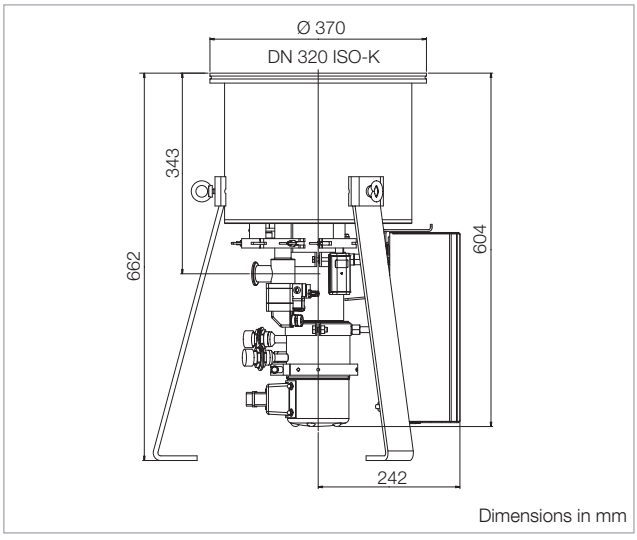


Advantages to the User

- Hydrocarbon-free high vacuum
- High capacity for argon and hydrogen
- High crossover value
- Simple operation
- Trouble-free integration into complex systems
- Fully automatic regeneration through integrated COOL.DRIVE controller [1)]
- Easy on-site servicing without pump disassembling and reconditioning of the vacuum system possible

Typical Applications

- Evaporators
- Sputtering systems
- Ion implanters
- Optical coating systems
- Metallization systems



Dimensional drawing for the COOLVAC 3000 iCL (DN 320 ISO-K)

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data

COOLVAC

		2000 iCL	3000 iCL
High vacuum (HV) flange	DN	250 ISO-K / 250 CF / 8" ANSI	320 ISO-K / 10" ANSI
Fore vacuum flange [2]	DN	25 ISO-KF	25 ISO-KF
Flange for connection a gauge head [3]	DN	16 ISO-KF	16 ISO-KF
Flange for the electrical connection	DN	16 CF	16 CF
Pressure-relief device with flange connection for gas exhaust line	DN	40 ISO-KF	40 ISO-KF
4-way current feedthrough for Si diode on a flange	DN	16 ISO-KF	16 ISO-KF
Heaters			
1st stage	W	160	160
	V AC	42	42
2nd stage	W	90	90
	V AC	42	42
Temperature sensor			
1st stage		Pt100	Pt100
2nd stage		Si diode	Si diode
Built-in cold head	COOLPOWER	7/25	7/25
Weight	kg (lbs)	29 (64)	35 (101.4)
Cooldown time to T_2 = 20 K	min	70	120
Crossover value	mbar x l (Torr x l)	250 (187)	500 (375)
Pumping speed			
H_2O	l/s	7000	10500
Ar / N_2	l/s	1600 / 2100	2500 / 3000
H_2	l/s	3200	6000
Capacity			
Ar / N_2	bar x l	1600 / 1600	2500 / 2500
H_2 at 10^{-6} mbar	bar x l	15 [4]	28 [4]
Max. throughput			
Ar / N_2	mbar x l/s (Torr x l/s)	12 (9) / 12 (9)	15 (11.2) / 15 (11.2)
H_2	mbar x l/s (Torr x l/s)	6 (4.5) [4]	10 (7.5) [4]
Helium connections (Self-sealing couplings: outside thread, type 5400-S2-8)	DN	1/2"	1/2"

1) Accessories, necessary for automatic operations (i.e. electrical regeneration heaters, forevacuum valve DN 25 ISO-KF, and vacuum gauge DN 16 ISO-KF), are included with the scope of delivery and are connected to the integrated COOL.DRIVE.
2) Electropneumatic angle valve included.
3) Vacuum gauge head included.
4) The maximum throughput values given for hydrogen (H_2) are true for regenerated cryo pumps under short-term loads only. For continuous operations, both throughput and capacity values will be lower.

Ordering Information

COOLVAC 2000 iCL

	Single Operation		Dual operation		Multiple operation	
	Europe	USA/Japan	High Voltage	Low Voltage	High Voltage	Low Voltage
	Part No.		Part No.		Part No.	
COOLVAC 2000 iCL						
DN 250 CF	844251V0002		844251V0002 (2x)		844251V0002 (3x)	
DN 8" ANSI	844251V0004		844251V0004 (2x)		844251V0004 (3x)	
DN 250 ISO-K	844251V0006		844251V0006 (2x)		844251V0006 (3x)	
Compressors, flexlines and cables						
Compressor						
CP 2000	840000V2000	–	–	–	–	–
CP 2200	–	840000V2200	–	–	–	–
CP 6000 H	–	–	840000V6001	–	840000V6001	–
CP 6200 H	–	–	–	840000V6201	–	840000V6201
Power supply cable for compressor	–		see Ordering Information of the compressor units			
Set of flexlines						
FL 4.5 (1/2", 1/2")	892 87		892 87 (2x)		892 87 (3x)	
or FL 9.0 (1/2", 1/2")	892 88		892 88 (2x)		892 88 (3x)	
or FL 18.0 HP (1/2") + FL 18.0 LP (1/2")	840203 + 840204		840203 (2x) + 840204 (2 x)		840203 (3x) + 840204 (3 x)	
Gas manifold (1 piece each)						
GD 2	–		840 253 (2x)		–	
GD 4	–		–		840 254 (2x)	
Compressor unit control cable [1]						
COOLPAK control cable, 5 m	844231V4005		844231V4005 (2x)		844231V4005 (3x)	
or COOLPAK control cable, 10 m	844231V4010		844231V4010 (2x)		844231V4010 (3x)	
or COOLPAK control cable, 20 m	844231V4020		844231V4020 (2x)		844231V4020 (3x)	
COOLPAK adapter for multi control	–		844231V5003		844231V5003	
Optional electronics, cables and equipment						
CRYOVISION control and display unit	844231V0002		844231V0002		844231V0002	
CRYOVISION control cables						
CRYOVISION control cable, 5 m	844231V2005		844231V2005		844231V2005	
or CRYOVISION control cable, 10 m	844231V2010		844231V2010		844231V2010	
or CRYOVISION control cable, 20 m	844231V2020		844231V2020		844231V2020	
Network control cable for the link between the pumps						
CRYOVISION / Network control cable, 5 m	–		844231V2005		844231V2005 (2x)	
or CRYOVISION / Network control cable, 10 m	–		844231V2010		844231V2010 (2x)	
or CRYOVISION / Network control cable, 20 m	–		844231V2020		844231V2020 (2x)	
Optional interface module						
COOLVAC ProfiBus module ProfiBus – RS232 Converter for COOL.DRIVE and CRYOVISION either COOLVAC ProfiBus module connected to COOL.DRIVE control and monitoring unit of each cryo pump (in this case CRYOVISION and network control not to apply)	844000V1		844000V1 (2x)		844000V1 (3x)	
or COOLVAC ProfiBus module connected to CRYOVISION [2]	844000V1		844000V1		844000V1	

The arrangement of the components is shown in the chapter “Accessories” under the heading “COOLVAC iClassicLine, System Components”.

1) The length of the control cable should match to the length of the flexlines.
2) At multiple operation with reduced communication speed to single cryo pumps.

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Ordering Information

COOLVAC 3000 iCL

	Single Operation		Dual operation	
	Europe	USA/Japan	High Voltage	Low Voltage
	Part No.		Part No.	
COOLVAC 3000 iCL				
DN 10" ANSI	844321V0004		844321V0004 (2x)	
DN 320 ISO-K	844321V0006		844321V0006 (2x)	
Compressors, flexlines and cables				
Compressor				
CP 2000	840000V2000	–	–	–
CP 2200	–	840000V2200	–	–
CP 6000 H	–	–	840000V6001	–
CP 6200 H	–	–	–	840000V6201
Power supply cable for compressor	–		see Ordering Information of the compressor units	
Set of flexlines				
FL 4.5 (1/2", 1/2")	892 87		892 87 (2x)	
or FL 9.0 (1/2", 1/2")	892 88		892 88 (2x)	
or FL 18.0 HP (1/2") + FL 18.0 LP (1/2")	840203 + 840204		840203 (2x) + 840204 (2 x)	
Gas manifold (1 piece each)				
GD 2	–		840 253 (2x)	
Compressor unit control cable [1]				
COOLPAK control cable, 5 m (16.4 ft)	844231V4005		844231V4005 (2x)	
or COOLPAK control cable, 10 m (32.81 ft)	844231V4010		844231V4010 (2x)	
or COOLPAK control cable, 20 m (65.62 ft)	844231V4020		844231V4020 (2x)	
COOLPAK adapter for multi control	–		844231V5003	
Optional electronics, cables and equipment				
CRYOVISION control and display unit	844231V0002		844231V0002	
CRYOVISION control cables				
CRYOVISION control cable, 5 m (16.4 ft)	844231V2005		844231V2005	
or CRYOVISION control cable, 10 m (32.81 ft)	844231V2010		844231V2010	
or CRYOVISION control cable, 20 m (65.62 ft)	844231V2020		844231V2020	
Network control cable for the link between the pumps				
CRYOVISION / Network control cable, 5 m (16.4 ft)	–		844231V2005	
or CRYOVISION / Network control cable, 10 m (32.81 ft)	–		844231V2010	
or CRYOVISION / Network control cable, 20 m (65.62 ft)	–		844231V2020	
Optional interface module				
COOLVAC ProfiBus module ProfiBus – RS232 Converter for COOL.DRIVE and CRYOVISION either COOLVAC ProfiBus module connected to COOL.DRIVE control and monitoring unit of each cryo pump (in this case CRYOVISION and network control not to apply)	844000V1		844000V1 (2x)	
or COOLVAC ProfiBus module connected to CRYOVISION [2]	844000V1		844000V1	

The arrangement of the components is shown in the chapter “Accessories” under the heading “COOLVAC iClassicLine, System Components”.

1) The length of the control cable should match to the length of the flexlines.
2) At multiple operation with reduced communication speed to single cryo pumps.

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

COOLVAC 5000 iCL

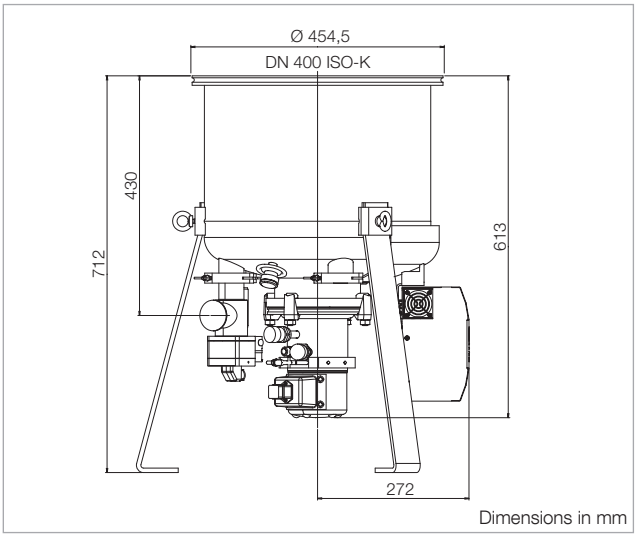


Advantages to the User

- Hydrocarbon-free high vacuum
- High capacity for argon and hydrogen
- High crossover value
- Simple operation
- Trouble-free integration into complex systems
- Fully automatic regeneration through integrated COOL.DRIVE controller [1)]
- Easy on-site servicing without pump disassembling and reconditioning of the vacuum system possible

Typical Applications

- Evaporators
- Electron beam welding systems
- Ion implanters
- Optical coating systems
- Metallization systems



Dimensional drawing for the COOLVAC 5000 iCL

COOLVAC 10000 iCL

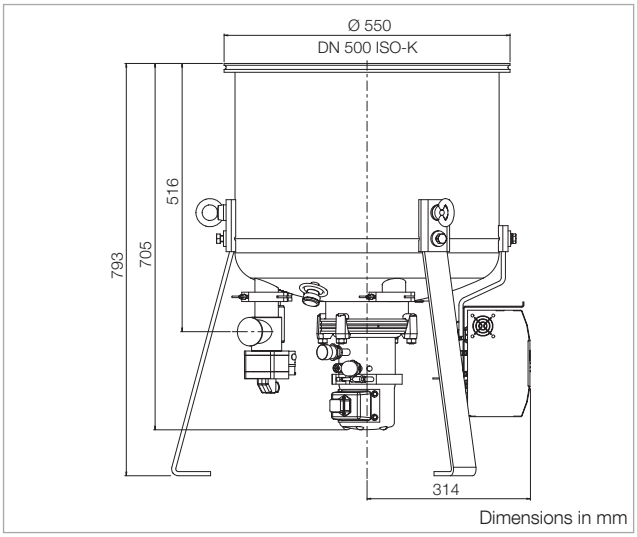


Advantages to the User

- Hydrocarbon-free high vacuum
- High capacity for argon and hydrogen
- High crossover value
- Simple operation
- Trouble-free integration into complex systems
- Fully automatic regeneration through integrated COOL.DRIVE controller [1)]
- Easy on-site servicing without pump disassembling and reconditioning of the vacuum system possible

Typical Applications

- Evaporators
- Electron beam welding systems
- Ion implanters
- Optical coating systems
- Metallization systems



Dimensional drawing for the COOLVAC 10000 iCL

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data

COOLVAC

		5000 iCL	10000 iCL
High vacuum (HV) flange	DN	400 ISO-K	500 ISO-K / 500 – 20" ANSI
Fore vacuum flange [2]	DN	40 ISO-KF	40 ISO-KF
Flange for connection of a gauge head [3]	DN	16 ISO-KF	16 ISO-KF
Flange for the electrical connection	DN	40 ISO-KF	40 ISO-KF
Pressure-relief device with flange connection for gas exhaust line	DN	40 ISO-KF	40 ISO-KF
4-way current feedthrough for Si diode on a flange	DN	16 ISO-KF	16 ISO-KF
Heaters			
1st stage	W	160	160
	V AC	42	42
2nd stage	W	90	90
	V AC	42	42
Temperature sensor			
1st stage		Pt100	Pt100
2nd stage		Si diode	Si diode
Built-in cold head	COOLPOWER	5/100	5/100
Weight	kg (lbs)	53 (116.9)	70 (154.3)
Cooldown time to T_2 = 20 K	min	100	150
Crossover value	mbar x l (Torr x l)	700 (525)	800 (600)
Pumping speed			
H_2O	l/s	18000	30000
Ar / N_2	l/s	4000 / 5200	8400 / 10000
H_2	l/s	6200	10000
Capacity			
Ar / N_2	bar x l	3000 / 3000	5500 / 5500
H_2 at 10^{-6} mbar	bar x l	32 [4]	45 [4]
Max. throughput			
Ar / N_2	mbar x l/s (Torr x l/s)	10 (7.5) / 10 (7.5)	10 (7.5) / 10 (7.5)
H_2	mbar x l/s (Torr x l/s)	7 (5.3) [4]	7 (5.3) [4]
Helium connection (Self-sealing couplings: outside thread, types 5400-S2-8	DN	1/2"	1/2"

1) Accessories, necessary for automatic operations (i.e. electrical regeneration heaters, forevacuum valve DN 25 ISO-KF, and vacuum gauge DN 16 ISO-KF), are included with the scope of delivery and are connected to the integrated COOL.DRIVE.
2) Electropneumatic angle valve included.
3) Vacuum gauge head included.
4) The maximum throughput values given for hydrogen (H_2) are true for regenerated cryo pumps under short-term loads only. For continuous operations, both throughput and capacity values will be lower.

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Ordering Information

	COOLVAC 5000 iCL		COOLVAC 10000 iCL	
	High Voltage	Low Voltage	High Voltage	Low Voltage
	Part No.		Part No.	
COOLVAC 5000 iCL, DN 400 ISO-K	844411V0006		–	
COOLVAC 10000 iCL, DN 500 20" ANSI	–		844511V0004	
COOLVAC 10000 iCL, DN 500 ISO-K	–		844511V0006	
Compressors, flexlines and cables				
Compressor				
CP 6000 H	840000V6001	–	840000V6001	–
CP 6200 H	–	840000V6201	–	840000V6201
Power supply cable for compressor	see Ordering Information of the compressor units			
Set of flexlines				
FL 4.5 (1/2", 1/2")	892 87		892 87	
or FL 9.0 (1/2", 1/2")	892 88		892 88	
or FL 18.0 HP (1/2") + FL 18.0 LP (1/2")	840203 + 840204		840203 + 840204	
Compressor unit control cable [1]				
COOLPAK control cable, 5 m (16.4 ft)	844231V4005		844231V4005	
or COOLPAK control cable, 10 m (32.81 ft)	844231V4010		844231V4010	
or COOLPAK control cable, 20 m (65.62 ft)	844231V4020		844231V4020	
Optional electronics, cables and equipment				
CRYOVISION control and display unit	844231V0002		844231V0002	
CRYOVISION control cables				
CRYOVISION control cable, 5 m (16.4 ft)	844231V2005		844231V2005	
or CRYOVISION control cable, 10 m (32.81 ft)	844231V2010		844231V2010	
or CRYOVISION control cable, 20 m (65.62 ft)	844231V2020		844231V2020	
Optional interface module				
COOLVAC ProfiBus module ProfiBus – RS232 Converter for COOL.DRIVE and CRYOVISION	844000V1		844000V1	

The arrangement of the components is shown in the chapter “Accessories” under the heading “COOLVAC iClassicLine, System Components”.

1) The length of the control cable should match to the length of the flexlines.

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Notes

COOLVAC 18000 iCL



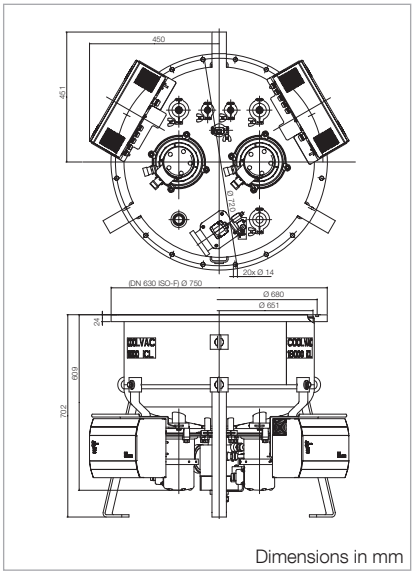
COOLVAC 18000 iCL with flange DN 630 ISO-F

Advantages to the User

- Hydrocarbon-free high vacuum
- High pumping speed for water vapor and nitrogen
- Fast, safe and efficient regeneration with the electric regeneration system [1)]
- Simple operation

Typical Applications

- Space simulation chambers
- Evaporators
- Electron beam welding systems
- Optical coating systems
- Metallization systems



Dimensional drawing for the COOLVAC 18000 iCL

COOLVAC 30000 iCL



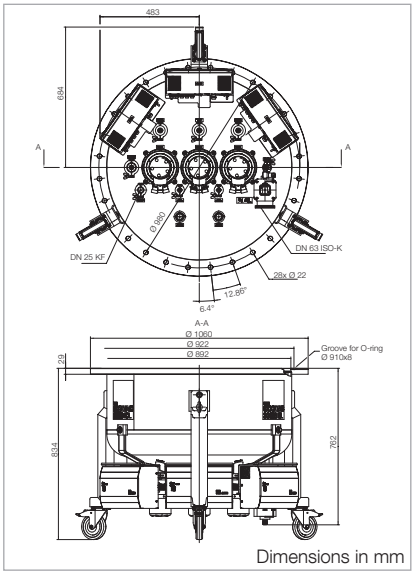
COOLVAC 30000 iCL with special flange

Advantages to the User

- Hydrocarbon-free high vacuum
- High pumping speed for water vapor and nitrogen
- Fast, safe and efficient regeneration with the electric regeneration system [1)]
- Simple operation

Typical Applications

- Space simulation chambers
- Evaporators
- Electron beam welding systems
- Optical coating systems
- Metallization systems



Dimensional drawing for the COOLVAC 30000 iCL

COOLVAC 60000 iCL



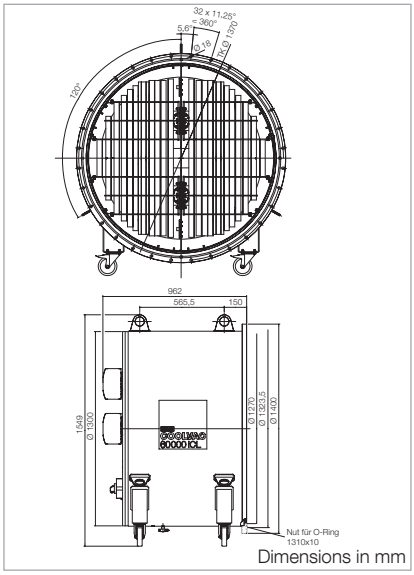
COOLVAC 60000 iCL with flange DN 1250 ISO-F

Advantages to the User

- Hydrocarbon-free high vacuum
- High pumping speed for water vapor and nitrogen
- Fast, safe and efficient regeneration with the electric regeneration system [1)]
- Simple operation

Typical Applications

- Space simulation chambers
- Evaporators
- Electron beam welding systems
- Optical coating systems
- Metallization systems



Dimensional drawing for the COOLVAC 60000 iCL

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Techncal Data

		COOLVAC 18000 iCL	COOLVAC 30000 iCL	COOLVAC 60000 iCL
High vacuum flange	DN	630 ISO-F	35"ANSI	1250 ISO-F
Fore vacuum flange [2]	DN	63 ISO-K	63 ISO-K	63 ISO-K
Flange with current feedthrough for silicon diode	DN	25 ISO-KF (2x)	16 ISO-KF (2x)	16 ISO-KF (2x)
Flange for other purposes	DN	40 ISO-KF	-	-
Flange with 11-way feedthrough with additional Pt 100 on flange	DN	-	40 ISO-KF	40 ISO-KF
Pressure-relief device with flange connection for gas exhaust line	DN	40 ISO-KF	40 ISO-KF	40 ISO-KF
Pumping speed				
H_2O	l/s	46000	93000	180000
Ar / N_2	l/s	13500 / 18000	25000 / 30000	47000 / 57000
H_2	l/s	14000	30000	60000
Capacity				
Ar / N_2	bar x l	6000	6500	9000
H_2 at 10^{-6} mbar	bar x l	65 [3]	100 [3]	150 [3]
Built-in cold head	COOLPOWER	5/100 (2x)	5/100 (2x) and 140T (1x)	5/100 (2x) and 140T (2x)
Max. throughput				
Ar / N_2	mbar x l/s (Torr x l/s)	14 (10.5)	14 (10.5)	25 (18.75)
H_2	mbar x l/s (Torr x l/s)	7 (5.25) [3]	7 (5.25) [3]	12 (9) [3]
Crossover value at 20 K	mbar x l (Torr x l)	800 (600)	1200 (900)	1000 (750)
Cool down time to 20 K	min	180	260	330
Overall height	mm	see drawing	see drawing	see drawing
Weight	kg (lbs)	131 (289)	262 (577.6)	503 (1109)
Silicon diode for temperature measurements at the second stage of the cold head		built-in (2x)	built-in (2x)	built-in (2x)
Regeneration heaters at the				
first stage of the cold head		built-in (2x)	built-in (3x)	built-in (4x)
second stage of the cold head		built-in (2x)	built-in (2x)	built-in (2x)

1) Accessories, necessary for automatic operations (i.e. electrical regeneration heaters, forevacuum valve DN 63 ISO-KF, and vacuum gauge DN 16 ISO-KF), are included with the scope of delivery and are connected to the integrated COOL.DRIVE.
2) Electropneumatic angle valve included.
3) The maximum throughput values given for hydrogen (H_2) are true for regenerated cryo pumps under short-term loads only. For continuous operations, both throughput and capacity values will be lower.

Ordering information

	COOLVAC 18000 iCL		COOLVAC 30000 iCL		COOLVAC 60000 iCL	
	High Voltage	Low Voltage	High Voltage	Low Voltage	High Voltage	Low Voltage
	Part No.		Part No.		Part No.	
COOLVAC 18 000 iCL, DN 630 ISO-F	844631V0006		–		–	
COOLVAC 30 000 iCL, 35" ANSI	–		844891V9005		–	
COOLVAC 60 000 iCL, DN 1250 ISO-F	–		–		844896V9005	
Compressors, flexlines and cables						
Compressor						
CP 6000 H	840000V6001 (2x)	–	840000V6001 (3x)	–	840000V6001 (4x)	–
CP 6200 H	–	840000V6201 (2x)	–	840000V6201 (3x)	–	840000V6201 (4x)
Power supply cable for compressor	see Ordering Information of the compressor units					
Set of flexlines						
FL 4.5 (1/2", 1/2")	892 87 (2x)		892 87 (3x)		892 87 (4x)	
or FL 9.0 (1/2", 1/2")	892 88 (2x)		892 88 (3x)		892 88 (4x)	
or FL 18.0 HP (1/2") + FL 18.0 LP (1/2")	840203 (2x) + 840204 (2x)		840203 (3x) + 840204 (3x)		840203 (4x) + 840204 (4x)	
Compressor unit control cable [1]						
COOLPAK control cable, 5 m (16.4 ft)	844231V4005 (2x)		844231V4005 (3x)		844231V4005 (4x)	
or COOLPAK control cable, 10 m (32.81 ft)	844231V4010 (2x)		844231V4010 (3x)		844231V4010 (4x)	
or COOLPAK control cable, 20 m (65.62 ft)	844231V4020 (2x)		844231V4020 (3x)		844231V4020 (4x)	
Optional electronics, cables and equipment						
CRYOVISION control and display unit	844231V0002					
CRYOVISION network / control cable						
CRYOVISION / Network control cable, 5 m (16.4 ft)	844231V2005					
or CRYOVISION / Network control cable, 10 m (32.81 ft)	844231V2010					
or CRYOVISION / Network control cable, 20 m (65.62 ft)	844231V2020					
Optional interface module						
COOLVAC ProfiBus module ProfiBus – RS232 Converter for COOL.DRIVE and CRYOVISION	844000V1					

The arrangement of the components is shown in the chapter “Accessories” under the heading “COOLVAC iClassicLine, System Components”.

1) The length of the control cable should match to the length of the flexlines.

Cryo Pumps for Manual Operation, BasicLine

The COOLVAC cryo pumps of the BasicLine version are identical to the COOLVAC cryo pumps of the iClassicLine version concerning the technical data for pumping speed, capacity, cooldown time, built-in cold heads, maximum throughput, built-in temperature sensors for the second stage (Si diode) and the corresponding current feedthroughs.

The standard BasicLine models do **not** include the following components:

- Electrical regeneration heaters
- Temperature sensors for the first stages of the cold head(s)
- Vacuum gauge head
- Fore vacuum valve
- Temperature readout / display unit for the silicon diode(s)

We are glad to advise you of our assortment of accessories for our COOLVAC BasicLine range of cryo pumps.

All cryo pumps of the *iClassicLine* series (iCL) described above can be delivered as *Basicline* types, too. Please consult with our technical support.

E.g. for the following part numbers:

	Part No.
COOLVAC 10000 BL-V, DN 500 20" ANSI	844511V1004
COOLVAC 10000 BL-V, DN 500 ISO-K	844511V1006

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Cryo Pumps with Liquid Nitrogen Cooling of Radiation Shield and Baffle of Cryo Pump

COOLVAC 30000 BL LN_2 and COOLVAC 60000 BL LN_2



COOLVAC 30000 BL LN_2



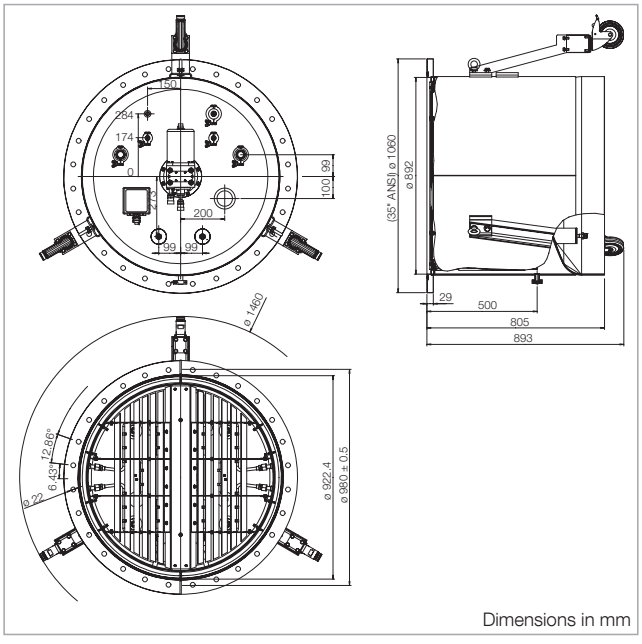
COOLVAC 60000 BL LN_2 with flange DN 1250 ISO-F

Advantages to the User

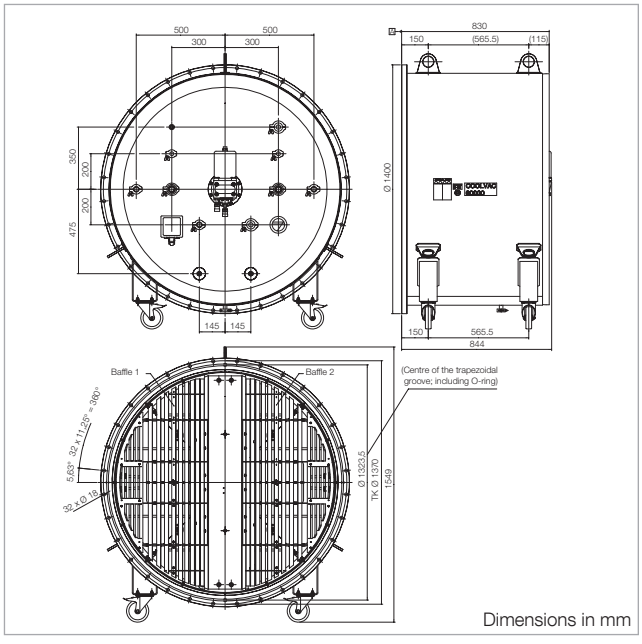
- Hydrocarbon-free high vacuum
- High pumping speed for water vapor and nitrogen
- Operating with only one compressor unit through liquid nitrogen (LN_2) cooling of radiation shield and baffle
- Controlling of radiation shield and baffle temperatures by additional temperature sensor

Typical Applications

- Space simulation chambers
- Vacuum furnaces



Dimensional drawing of COOLVAC 30000 BL LN_2



Dimensional drawing of COOLVAC 60000 BL LN_2

Technical Data		COOLVAC 30000 BL LN_2	COOLVAC 60000 BL LN_2
High vacuum flange	DN	35"ANSI	1250 ISO-F
Fore vacuum flange	DN	63 ISO-K	63 ISO-K
Flange with 4-pole current feedthrough for silicon diode*	DN	16 ISO-KF (2x)	16 ISO-KF (2x)
Flange with 6-pole current feedthrough for 3 Pt 100 (radiation shield and baffle halves)	DN	40 ISO-KF	40 ISO-KF
Pressure-relief device with flange connection for gas exhaust line	DN	40 ISO-KF	40 ISO-KF
Flange with abnormal temperature protection for the regeneration heaters of the built-in cold head	DN	40 ISO-KF	40 ISO-KF
Pumping speed			
H_2O	l/s	93000	180000
Ar / N_2	l/s	25000 / 30000	47000 / 57000
H_2	l/s	30000	60000
Capacity			
Ar / N_2	bar x l	6500	9000
H_2 at 10^{-6} mbar	bar x l	100 [1)]	150 [1)]
Built-in cold head	COOLPOWER	10 MD	10 MD)
Max. throughput Ar / N_2	mbar x l/s (Torr x l/s)	> 15 (11.25) [1)]	> 30 (22.5) [1)]
Crossover value at 20 K	mbar x l (Torr x l)	2000 (1500)	3000 (2250)
LN_2 consumption, ca.	l/h	7	10
LN_2 connections		SS-8-VCR (1/2")	SS-8-VCR (1/2")
Cool down time to 20 K, approx.	h	5	6
Overall height	mm	see drawing	see drawing
Weight, approx.	kg (lbs)	300 (661)	400 (882)
Silicon diode for temperature measurements at the second stage of the cold head		built-in	built-in
Regeneration heaters at the			
first stage of the cold head		built-in	built-in
second stage of the cold head		built-in	built-in

* temperature sensor at the second stage of the cold head.

[1)] The maximum throughput values given for hydrogen (H_2) are true for regenerated cryo pumps under short-term loads only. For continuous operations, both throughput and capacity values will be lower.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

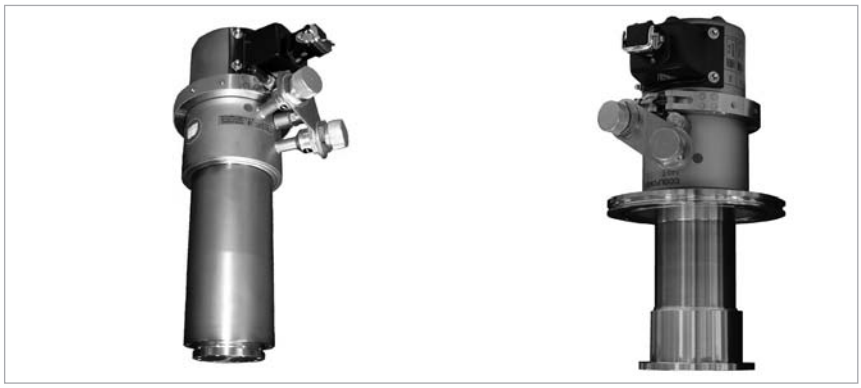
Ordering information

	COOLVAC 30000 BL LN_2		COOLVAC 60000 BL LN_2	
	High Voltage	Low Voltage	High Voltage	Low Voltage
	Part No.		Part No.	
COOLVAC 30 000 BL LN_2, 35" ANSI	844890V9501		–	
COOLVAC 60 000 BL LN_2, DN 1250 ISO-F	–		844895V9503	
Compressors, flexlines and cables				
Compressor				
CP 6000 HMD, 400 V / 50 Hz / 460 V / 60 Hz / 3-ph.	840000V6002	–	840000V6002	–
CP 6200 HMD, 200 V / 50 Hz / 200 – 230 V / 60 Hz / 3-ph.	–	840000V6202	–	840000V6202
Power supply cable for compressor	see Ordering Information of the compressor units			
Flexible pressure line (for operating mechanically driven cold heads)				
9 m (29.53 ft), FL9 HP – DN20 (8f/8f) + FL9 LP – DN32 (8f/8f)	840217 + 840218V0032			
20 m (65.62 ft), FL20 HP – DN20 (8f/8f) + FL20 LP – DN32 (8f/8f)	840230V2020 + 840231V2032			
Cable cold head motor compressor unit [1]				
9 m (29.53 ft)	842 110			
20 m (65.62 ft)	842 112			
Optional equipment and cables				
Low temperature measuring instrument MODEL 211S	844 110			
HV cable, 4-way, with plug to the MODEL 211S				
10 m (32.81 ft)	844 113			
20 m (65.62 ft)	844113V20			
Additional accessories (selection)				
Forevacuum valves [2]				
Right-Angle DN 63 ISO-K, electropneumatically operated, with pilot valve 24 V DC, Aluminum body	10800V01			
Right-Angle DN 63 ISO-K, electropneumatically operated, with pilot valve 24 V DC, stainless steel body	10810V01			
Pressure sensor				
THERMOVAC Transmitter TTR 91 N, DN 16 ISO-KF (without switching threshold)	230035V02			
THERMOVAC Transmitter TTR 91 N, DN 16 ISO-KF, (with switching threshold, 2SP)	230040V02			
Connection cable to TTR 91 N, FCC 68 on both ends, 8-way shielded [3]	Type A			
10 m (32.81 ft)	230 012			
20 m (65.62 ft)	124 28			
30 m (98.43 ft)	124 29			

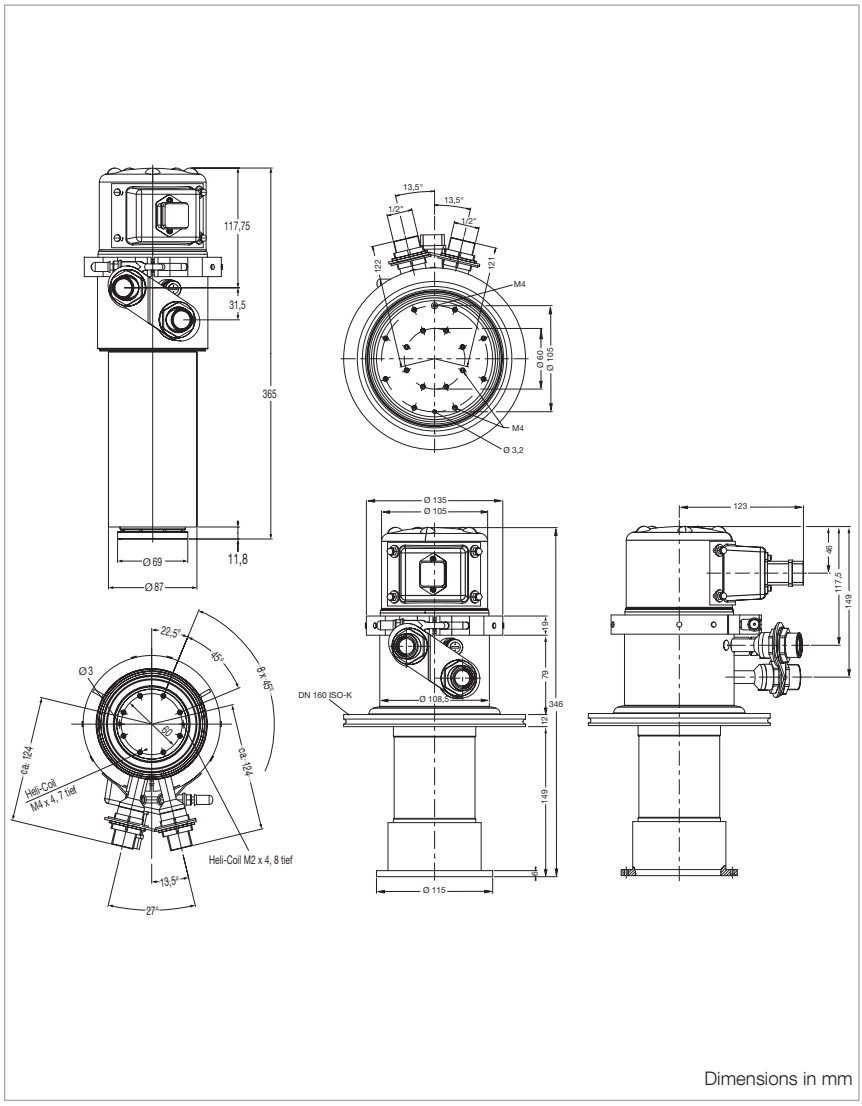
1) The length of the control cable should match to the length of the flexlines.
2) See catalog "Valves" for additional right-angle valves.
3) The length of the control cable should match to the length of the flexlines.

Products Cryogenics

Cold Heads, Pneumatically Driven
Single-Stage Cold Heads
COOLPOWER 50 and 140 T



Single-stage cold head's COOLPOWER 50 (left) and 140 T (right)



Dimensional drawing for the COOLPOWER 50 (left) and COOLPOWER 140 T (right)

Advantages to the User

- For installation mostly in any orientation
- High refrigerating capacity
- No liquid refrigerants are required
- Very simple to operate
- Short cooldown time

Typical Applications

- Cooling of samples, sensors and detectors
  - e. g. cooling of detectors in astronomy
- Cooling of HTS superconductors
- Cooling in magnetic equipment
- Cooling of surfaces for pumping of gases
- Cryogenic process gas cleaning
- Condensation, resublimation and freezing of gases

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data

		COOLPOWER 50	COOLPOWER 140 T
Refrigeration capacity at 50/60 Hz [1]			
at 80 K, approx.	W	50	140
at 20 K, approx.	W	–	20
Lowest attainable temperature [1]	K	≤ 26	≤ 15
Cooldown time down			
to 20 K, approx.	min	–	55
to 80 K, approx.	min	20	–
Permissible ambient temperature	°C (°F)	+10 to +40 (+50 to +104)	+10 to +40 (+50 to +104)
He filling pressure at room temperature	barg	16	16
He connections			
Self-sealing screwed connections			
High pressure connection		1/2" [2]	1/2" [2]
Low pressure connection		1/2" [2]	1/2" [2]
Weight	kg (lbs)	8 (17.7)	12 (26.5)

Ordering Information

		COOLPOWER 50		COOLPOWER 140 T		
		Part No.		Part No.		
Cold head						
with DN 100 CF-R (rotatable)		**842050V0001**	–	–	–	–
with DN 160 CF-R (rotatable)		–	–	–	**842030V9004**	–
with DN 160 ISO-K		**842050V0002**	–	**842 030**	–	–
with weld-on pipe		–	**842050V0000**	–	–	**842030V0001**
Distance Flange - Cold stage	mm	149.5	–	148.5	111.4	–
Accessories						
Compressor unit (for operation of one cold head)						
COOLPAK 2000, 230 V / 50 Hz		**840000V2000**		–		
COOLPAK 2200, 208 V / 60 Hz		**840000V2200**		–		
COOLPAK 6000 H, 400 V/50 Hz; 470 V / 60 Hz		–		**840000V6001**		
COOLPAK 6200 H, 200 V/50 Hz; 200 V, 230 V / 60 Hz		–		**840000V6201**		
Power supply cable		–		see Ordering Information for the compressor units COOLPAK		
Set of flexlines						
FL 4.5 (1/2", 1/2") (= 1 Set)		**892 87**		**892 87**		
FL 9.0 (1/2", 1/2") (= 1 Set)		**892 88**		**892 88**		
FL 18.0 HP (1/2") (= Single line high pressure)		**840 203**		**840 203**		
FL 18.0 LP (1/2") (= Single line low pressure)		**840 204**		**840 204**		
Connecting cable compressor – cold head						
Power cord 4.5 m (15.75 ft)		**E 400000323**		**E 400000323**		
Power cord 18 m (59.06 ft)		**840002964V0018**		**840002964V0018**		
Extension cord 4.5 m (15.75 ft)		**893 74**		**893 74**		
Options						
Temperature measurement						
Silicon diode		**844000V5**		**844000V5**		
Low temperature measuring instrument		**844 110**		**844 110**		
Measuring cable		see Ordering Information low temperature measuring instrument		see Ordering Information low temperature measuring instrument		

[1] The refrigerating capacities and temperatures stated apply only to vertical operation with the cold end at the bottom.

[2] Series 5400 from Aeroquip, coupling size "-8" (#8), or compatible types.

Dual-Stage Cold Heads COOLPOWER 7/25 and 5/100



Dual-stage cold head COOLPOWER 7/25



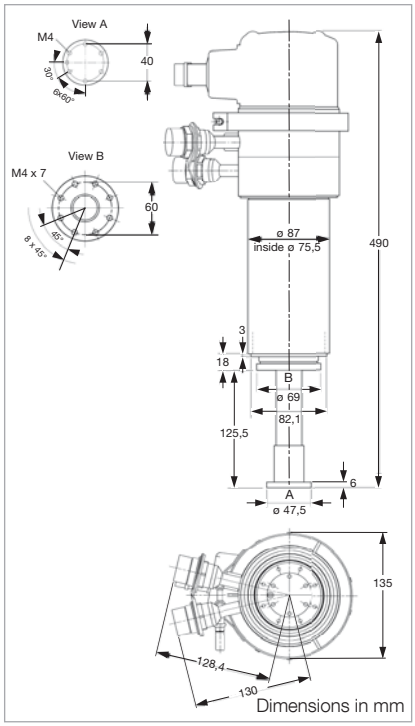
Dual-stage cold heads COOLPOWER 5/100

Advantages to the User

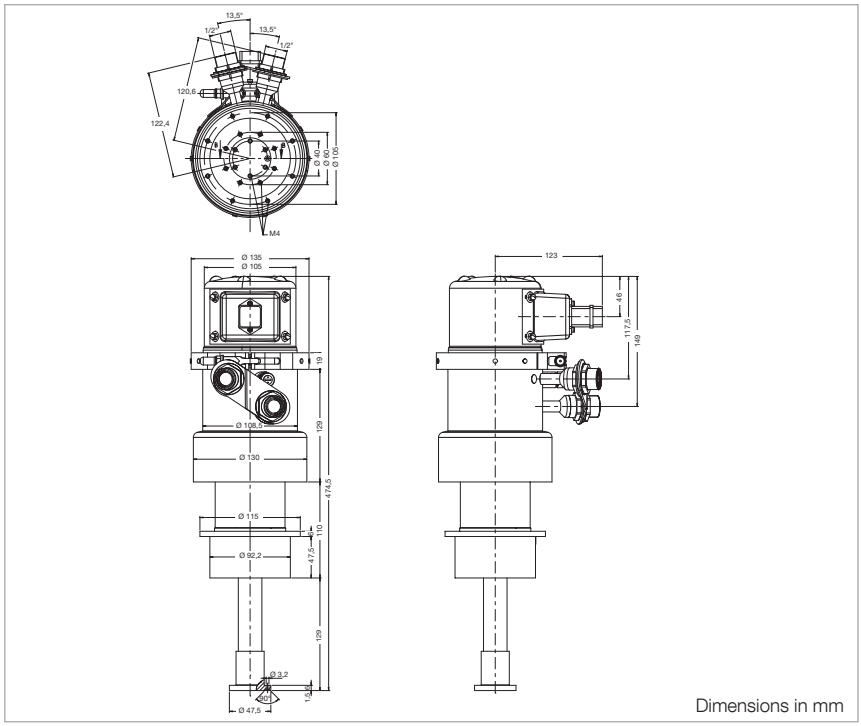
- For installation in any orientation
- High refrigerating capacity
- No liquid refrigerants are required
- Very simple to operate
- Short cooldown time

Typical Applications

- Cooling of samples, sensors and detectors
  - Cooling of detectors in astronomy
  - Cooling of samples for spectroscopy
  - Cooling of samples for applications in medicine and R&D
- Cooling of HTS superconductors
- Cooling in magnetic equipment
- Cooling of surfaces for pumping of gases
- Cryogenic process gas cleaning
- Condensation, resublimation and freezing of gases



Dimensional drawing for the COOLPOWER 7/25



Dimensional drawing for the COOLPOWER 5/10

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data

		COOLPOWER 7/25	COOLPOWER 5/100
Refrigeration capacity at 50/60 Hz [1]			
1st stage at 80 K, approx.	W	25	100
2nd stage at 20 K, approx.	W	7	6
Lowest attainable temperature [1]			
1st stage, approx.	K	≤ 35	≤ 35
2nd stage, approx.	K	≤ 10	≤ 10
Cooldown time of the			
2nd stage to 20 K, approx.	min	35	25
Permissible ambient temperature	°C (°F)	+5 to +40 (+41 to +104)	+5 to +40 (+41 to +104)
He filling pressure at room temperature	barg	16	16
He connections			
Self-sealing screwed connections			
High pressure connection		1/2" (#8 [2])	1/2" (#8 [2])
Low pressure connection		1/2" (#8)	1/2" (#8)
Weight, approx.	kg (lbs)	10 (22,1)	10,5 (23,2)

Ordering Information

	COOLPOWER 7/25 Part No.	COOLPOWER 5/100 Part No.
Cold head		
COOLPOWER 7/25		
- with weld-on pipe	**842 040**	–
- with Flange DN 160 ISO-K (Space Flange – 2. Stage = 250 mm)	**842 040V0002**	–
- with Flange DN 100 CF-R (rotatable) (Space Flange – 2. Stage = 275 mm)	**842 040V0005**	–
COOLPOWER 5/100		
- with weld-on pipe	–	**893 05**
- with Flange DN 160 ISO-K (Space Flange – 2. Stage = 277,5 mm)	–	**893 04**
- with Flange DN 100 CF-R (rotatable) (Space Flange – 2. Stage = 265,5 mm)	–	**842021V0001**
Accessories		
Compressor unit (for operation of one cold head)		
COOLPAK 2000, 230 V / 50 Hz	**840000V2000**	–
COOLPAK 2200, 208 V / 60 Hz	**840000V2200**	–
COOLPAK 6000 H 400 V/50 Hz; 470 V / 60 Hz	–	**840000V6001**
COOLPAK 6200 H 200 V/50 Hz; 200 V, 230 V / 60 Hz	–	**840000V6201**
Power supply cable	–	see Ordering Information for the compressor units COOLPAK
Set of flexlines		
FL 4.5 (1/2", 1/2") (= 1 Set)	**892 87**	**892 87**
FL 9.0 (1/2", 1/2") (= 1 Set)	**892 88**	**892 88**
FL 18.0 HP (1/2") (= Single line high pressure)	**840 203**	**840 203**
FL 18.0 LP (1/2") (= Single line low pressure)	**840 204**	**840 204**
Connecting cable compressor – cold head		
Power cord 4.5 m (15.75 ft)	**E 400000323**	**E 400000323**
Power cord 18 m (59.06 ft)	**840002964V0018**	**840002964V0018**
Extension cord 4.5 m (15.75 ft)	**893 74**	**893 74**
Options		
Temperature measurement / control		
Silicon diode	**844000V5**	**844000V5**
Low temperature measuring instrument	**844 110**	**844 110**
Measuring cable	see Ordering Information low temperature measuring instrument	see Ordering Information low temperature measuring instrument

[1] The refrigerating capacities and temperatures stated apply only to vertical operation with the cold end at the bottom.

[2] Series 5400 from Aeroquip, coupling size "-8" (#8), or compatible types.

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Cold Heads, Mechanically Driven
Single-Stage Cold Head COOLPOWER 250 MD
Dual-Stage Cold Head COOLPOWER 10 MD



Single-stage Cold Head COOLPOWER 250 MD



Dual-stage Cold Head COOLPOWER 10 MD

Advantages to the User

- Excellent cooling performance
- up to 250 W at 80 K by press-button operation [1) 2)] (COOLPOWER 250 MD)
- 18 W at 20 K by press-button operation (COOLPOWER 10 MD)
- High reliability
- Design optimized for MTBF 100,000 h
- Long and maintenance-free operation
- Low vibration due to directly driven displacer
- No liquid refrigerants are required
- Very simple to operate
- Short cooldown time
- Easy operation
- Plug & Cool – as usual for all Leybold GM coolers
- Simple variation of motor speed via the COOLPAK MD compressor unit

COOLPOWER 250 MD – one of the strongest single-stage GM cooler available on the market:

- High cooling capacity of > 175 W at 80 K
- Cooling capacity up to 250 W at 80 K possible [1) 2)]

COOLPOWER 10 MD - the strongest 10 K GM cooler available on the market:

- High 2nd stage cooling capacity of > 18 W at 20 K
- High 1st stage cooling capacity of > 25 W at 40 K and 110 W at 80 K

Typical Applications

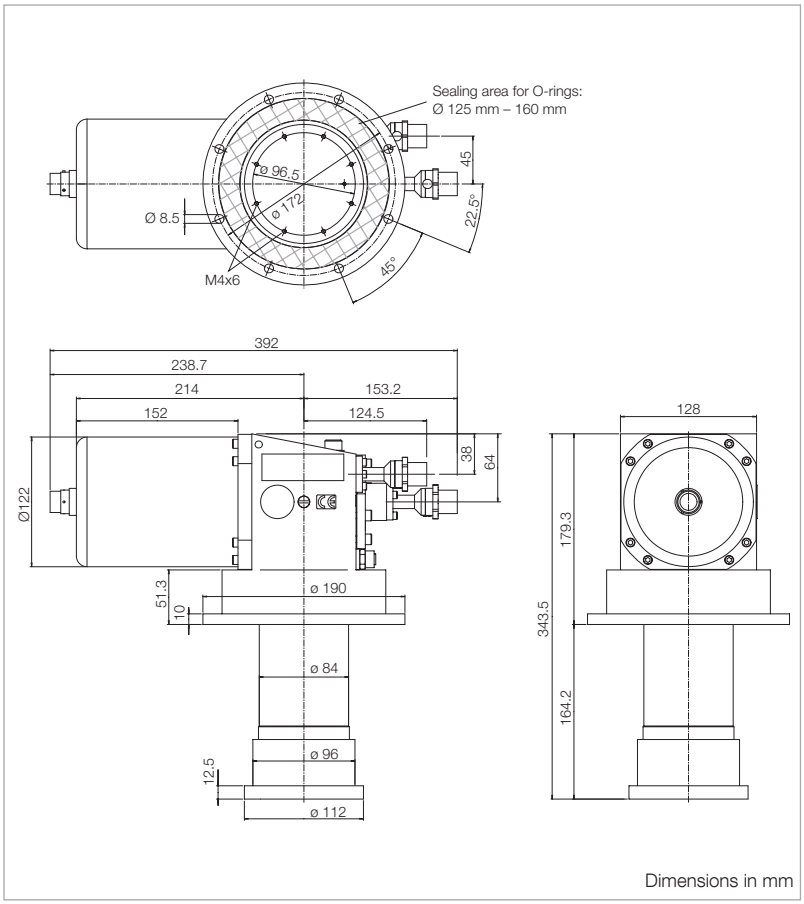
The COOLPOWER 250 MD is a mechanically driven single-stage Gifford McMahon (GM) cryo cooler and ideally suited for

- Shield cooling of superconducting magnets in MRI
- Cooling of cryopanels in special Cryo pumps
- Cooling of larger samples and devices; especially
  - High temperature superconductor coils, wires and bulk materials
  - Recondensation of liquid refrigerants such as nitrogen and argon
  - Cleaning of gases
  - Samples for spectroscopic investigations in solid state and surface physics
  - Infrared and gamma detectors
- Calibration of sensors

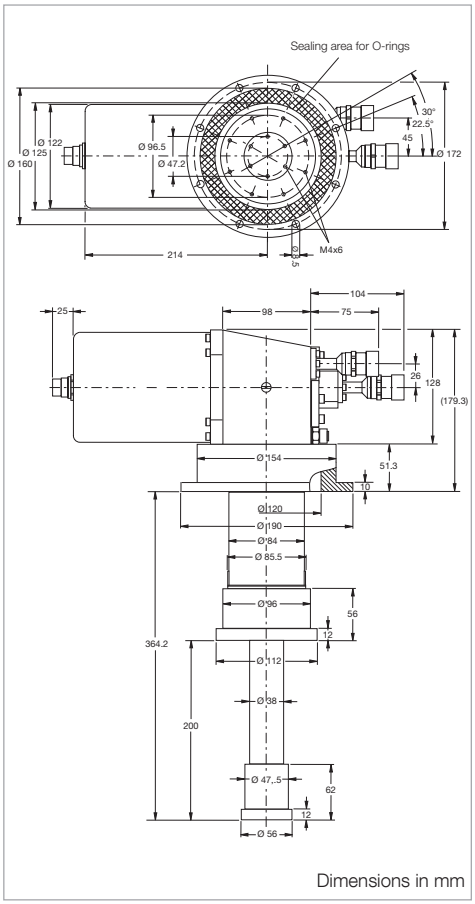
The COOLPOWER 10 MD is a mechanically driven double-stage Gifford McMahon (GM) cryo cooler and ideally suited for

- Cooling of cryo probes in NMR spectrometers
- Shield cooling of superconducting magnets in MRI
- Cooling of cryopanels in special Cryo pumps and thus generation of high vacuum and ultra-high vacuum pressures
- Cooling of larger samples and devices; especially
  - High temperature superconductor coils, wires and bulk materials
  - Recondensation of liquid refrigerants such as H_2, Ne
  - Samples for spectroscopic investigations in solid state and surface physics
  - Infrared and gamma detectors
- Calibration of sensors

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com



Dimensional drawing for the COOLPOWER 250 MD



Dimensional drawing for the COOLPOWER 10 MD

Technical Data

		COOLPOWER 250 MD	COOLPOWER 10 MD
Refrigeration capacity at 50/60 Hz [1]			
1st stage at 80 K, approx.	W	175 [2]	110
2st stage at 20 K, approx.	W	n/a	18
Lowest attainable temperature [1]			
1st stage, approx.	K	≤ 25	≤ 28
2nd stage, approx.	K	n/a	≤ 8
Cooldown time of the			
1st stage to 80 K, approx.	min	35	n/a
2nd stage to 20 K, approx.	min	n/a	25
Permissible ambient temperature	°C (°F)	+5 to +40 (+41 to +104)	
He filling pressure at room temperature	barg	15_{-1}	
He connections			
Self-sealing screwed connections			
High pressure connection		1/2" (#8 [3])	1/2" (#8 [3])
Low pressure connection		1/2" (#8)	1/2" (#8)
Weight, approx.	kg (lbs)	21 (46.3)	22 (48.5)

[1] The refrigerating capacities and temperatures stated apply to vertical operation with the cold end at the bottom and with cold head motor rotation speed 120 RPM, He system filling pressure 13 barg, compressor unit COOLPAK 6000 HMD / 6200 HMD and mit flexlines FL 9.0 HP – DN20 (840217) and FL 9.0 LP – DN32 (840218V0032).

[2] Higher refrigeration capacities of up to 250 W at 80 K (CP 250 MD) can be achieved with special parameters and accessories in consultation with our technical support team.

[3] Series 5400 "-8" from Aeroquip.

Ordering Information

	COOLPOWER 250 MD	COOLPOWER 10 MD
	Part No.	**Part No.**
Cold head		
COOLPOWER 250 MD	**842015V0001**	–
COOLPOWER 250 MD; DN 160 CF-R (rotatable)	**842015V0002**	–
COOLPOWER 10 MD	–	**842010**
COOLPOWER 10 MD; DN 160 CF-R (rotatable)	–	**842010V0002**
Accessories		
Compressor unit		
COOLPAK 6000 HMD, 400 V/3-ph. 50 Hz or 460 V/3-ph. 60 Hz ± 10%	**840000V6002**	**840000V6002**
COOLPAK 6200 HMD, 200 V/3-ph. 50 Hz or 200-230 V/3-ph. 60 Hz ± 10%	**840000V6202**	**840000V6202**
Power supply cable	see Ordering Information for the compressor unit COOLPAK	see Ordering Information for the compressor unit COOLPAK
Flexible pressure line (for operating mechanically driven cold heads)		
9 m (31.5 ft) (High-pressure) FL9 HP-DN 20 (8f/8f)	**840 217**	
9 m (31.5 ft) (Low-pressure) FL9 LP-DN 32 (8f/8f)	**840218V0032**	
20 m (75.0 ft) (High-pressure) FL20 HP-DN 20 (8f/8f)	**840230V2020**	
20 m (75.0 ft) (Low-pressure) FL20 LP-DN 32 (8f/8f)	**840231V2032**	
Connection cable for the cold heads COOLPOWER 250 MD, 10 MD		
9,0 m	**842 110**	
20,0 m	**842 112**	

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Notes

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

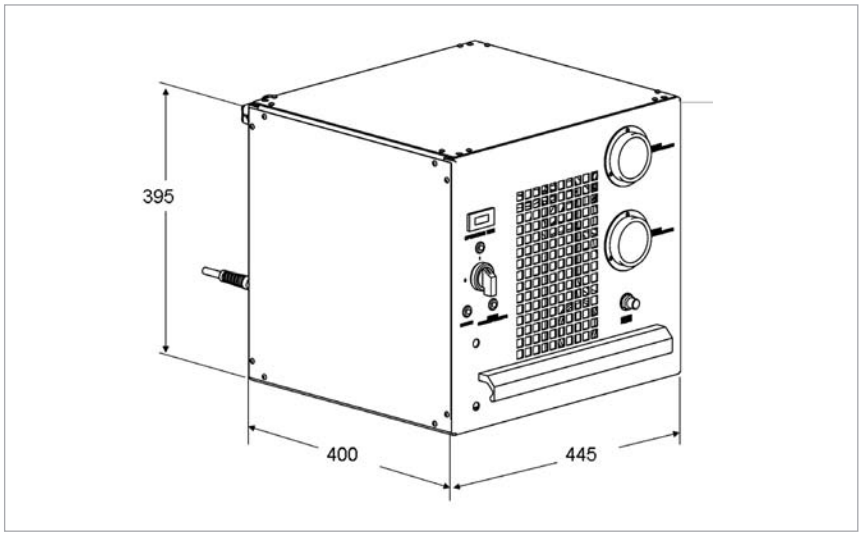
Compressor Units for Pneumatically Driven Cold Heads and Pumps, Water Cooling COOLPAK 2000/2200



Compressor unit COOLPAK 2000 (2200 is similar)

Advantages to the User

- High efficiency and increased performance for cryogenic pumps and refrigerators
- High long-term reliability due to long-life and highly efficient components and improved oil management
- Very quiet and low vibration operation through the innovative horizontally suspended scroll compressor
- Simple installation and operation
- Global mains voltage compatibility
- Perfect integration within complex systems due to the 24 V Sub-D interface
- Simple adsorber replacement, otherwise maintenance-free
- Small footprint
- Low cost of ownership



Dimensional drawing of the COOLPAK 2000/2200

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data

		COOLPAK 2000 (50 Hz)	COOLPAK 2200 (60 Hz)
Number of electrical connections for cold heads		1	1
Helium system filling pressure at room temperature	barg	15	14
Ambient temperature	°C (°F)	+5 to +40 (+41 to +104)	+5 to +40 (+41 to +104)
Cooling water consumption	l/min	< 5	< 5
Cooling water feed temperature	°C (°F)	+5 to +25 (+41 to +77)	+5 to +25 (+41 to +77)
Mains voltage (single phase)	V	230 ± 10%	208 ± 10%
Operating current			
with cooled down cold head	A	9.5 to 10.5	11.5 to 12.5
with warmed up cold head	A	12.0	13.0
Electric power consumption			
with cooled down cold head	kW	2.2	2.3
with warmed up cold head	kW	2.4	2.5
Remote control through interface	V DC	24	24
Helium connections			
self-sealing fittings			
high-pressure side (outside thread)		1/2" [1]	1/2" [1]
low-pressure side (outside thread)		1/2" [1]	1/2" [1]
Water connections	DN	10	10
Noise level (at a distance of 1 m (3.5 ft))	dB(A)	< 55	< 55
Dimensions (W x H x D)	mm (in.)	445 x 395 x 400 (17.52 x 15.55 x 15.74)	445 x 395 x 400 (17.52 x 15.55 x 15.74)
Weight, approx.	kg (lbs)	69 (152.32)	69 (152.32)

Ordering Information

	COOLPAK 2000 (50 Hz)	COOLPAK 2200 (60 Hz)
	Part No.	**Part No.**
Compressor unit	**840000V2000**	**840000V2200**
Accessories, optional		
Tool-Kit	**E20004779**	**E20004779**
Spare parts		
Adsorber CPS-V8	**E 840001973**	**E 840001973**

[1] Series 5400 from Aeroquip, coupling size "-8", or compatible types.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Compressor Units for Pneumatically Driven Cold Heads and Pumps, Water Cooling COOLPAK 6000 H/6200 H/6000 HD



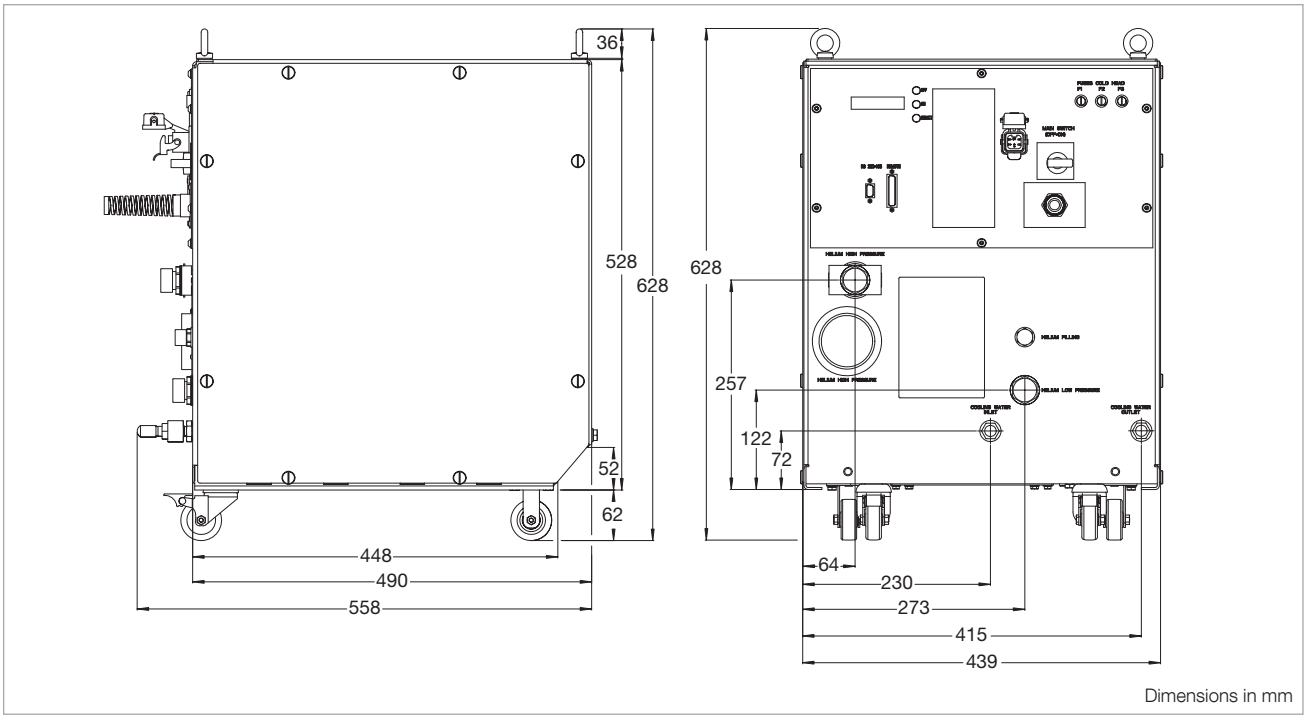
Compressor units COOLPAK 6000 H/6200 H/6000 HD

Used to drive cold heads with pneumatically driven displacer pistons, i.e. for individual operation of the COOLPOWER cold heads 140 T and 5/100, but also older cold heads such as the RGS 120, RGD 580 and 1245, as well as the multiplexing of COOLPOWER cold heads 50 and 7/25.

In addition, these compressors are used to operate COOLVAC cryo pumps with integrated cold heads of these types.

Advantages to the User

- Highly effective and even more powerful when connected with Leybold cryo pumps and refrigerators
- Excellent long-term reliability owing to the modular design and the long life components
- Silent and low vibration operation through scroll compressors
- Simple installation and operation
- Global power supply compatibility
- Easy integration in complex systems due to 24 V DC or RS 232 C interfaces
- Almost maintenance-free
- Small footprint
- Low cost of ownership



Dimensional drawing for the COOLPAK 6000 H/6200 H/6000 HD

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data

		COOLPAK			
		6000 H / 6000 HD		6200 H	
		50 Hz	60 Hz	50 Hz	60 Hz
Number of electrical connections for cold heads		1 / 2		1	
Helium system filling pressure at room temperature	barg	17	16	15	14
Ambient temperature	°C (°F)	+5 to +40 (+41 to +104)			
Cooling-water consumption [1]	l/min	5			
Cooling-water entry temperature	°C (°F)	+5 to +25 (+41 to +77)			
Main voltage (3 phase)					
upon delivery	V	400 ± 10%	–	230 [2] + 1% / -10%	230 ± 10%
alternative setting	V	–	470 ± 10%	200 ± 10%	200 ± 10%
Operating currents					
with cooled down cold head	A	10 to 12	–	20 to 22	–
with warmed up cold head	A	11 to 13	–	22 to 25	–
Electrical power consumption					
with cooled down cold head	kW	6.5 to 7.5	7.0 to 8.0	6.5 to 7.5	7.0 to 8.0
with warmed up cold head	kW	7.0 to 8.0	7.5 to 8.5	7.0 to 8.0	7.5 to 8.5
Remote control via interface		24 V DC or RS 232 C			
Helium connections					
Self-sealing couplings					
High pressure connection (outside thread)		1/2" [4]			
Low pressure connection (outside thread)		1/2" [4]			
Water connections		Hose nozzle DN 10 / G 1/2" outside thread			
Sound level (at 1 m (3.5 ft) distance)	dB(A)	60			
Dimensions (W x H x D)	mm (in.)	440 x 589 x 558 (17.32 x 23.19 x 21.97)			
Weight, approx.	kg (lbs)	104 (230)			

Ordering Information

	COOLPAK			
	6000 H / 6000 HD		6200 H	
	50 Hz	60 Hz	50 Hz	60 Hz
	Part No.	**Part No.**	**Part No.**	**Part No.**
Compressor unit without power supply cable				
Connection for 1 cold head (CP ... H)	**840000V6001**		**840000V6201**	
Connection for 2 cold heads (CP ... H)	**840000V6004**		**–**	
Power supply cable				
CEE plug, 32 A/6h, 3-pol +N+PE, 3.5 m (12.25 ft)	**893 95**	**–**	**–**	
NEMA plug, L 16-20 P, 20 A/480 V, 3-pol +PE (AWG 12), 3.5 m (12.25 ft)	**–**	**893 96**	**–**	
- with end splice (AWG 10), 10 m (35.0 ft)	**840 111**		**840 111**	
- with end splice (AWG 10), 20 m (70.0 ft)	**840 112**		**840 112**	
Accessories				
Tool-Kit	**E 20004779**		**E 20004779**	
Water cooling discharge throttle	**E 840000133** [3]		**–**	
Spare parts				
Adsorber CP6000H	**E 840002863**			

[1] At a cooling water entry temperature of 25 °C (77 °F).
[2] At 14 barg filling pressure.
[3] Only for COOLPAK 6000 HD.
[4] Series 5400 from Aeroquip, coupling size "-8", or compatible types.

Compressor Units for Mechanically Driven Cold Heads and Pumps, Water Cooling COOLPAK 6000 HMD/6200 HMD



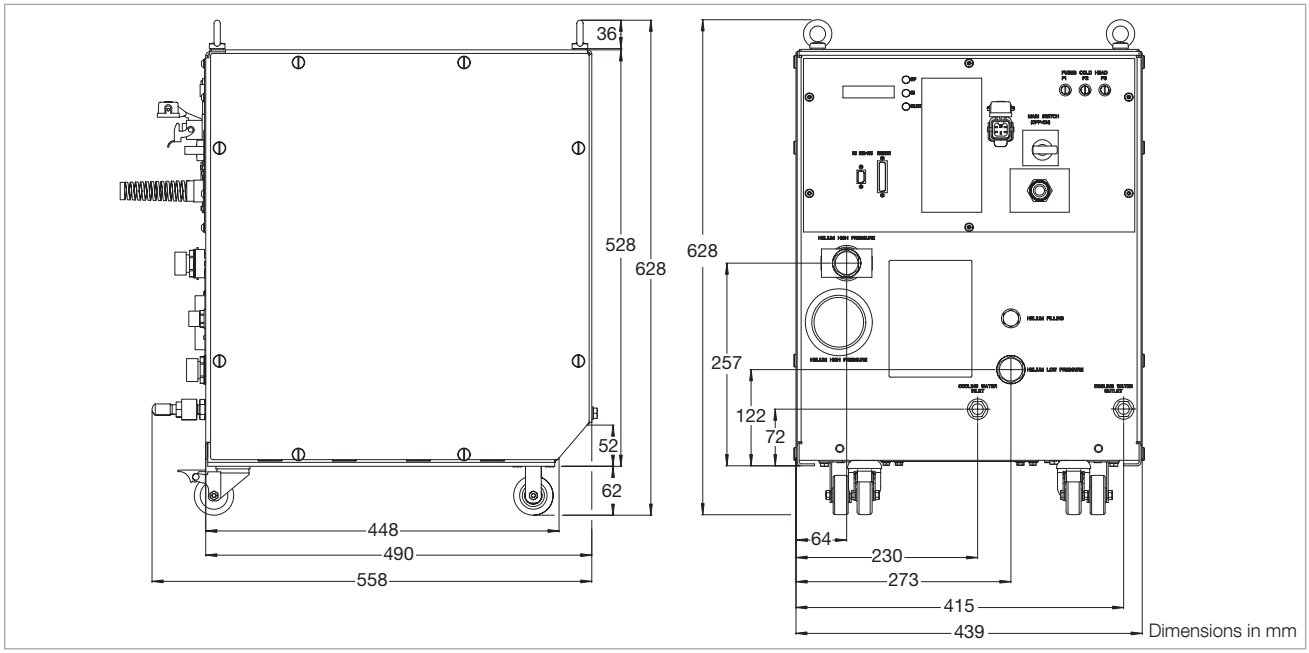
Compressor unit COOLPAK 6000 HMD/6200 HMD

Serves the purpose of individually driving the cold heads with mechanically driven displacers; i.e. COOLPOWER 250 MD and 10 MD.

In addition, these compressor units are also used for operating the COOLVAC cryo pumps 30000 BL LN_2 and COOLVAC 60000 BL LN_2.

Advantages to the User

- Highly effective and even more powerful when connected with Leybold cryo pumps and refrigerators
- Excellent long-term reliability owing to the modular design and the long life components
- Silent and low vibration operation through scroll compressors
- Small footprint
- Simple installation and operation
- Global power supply compatibility
- Easy integration in complex systems due to 24 V DC or RS 232 C interfaces
- Variable cold head motor speed, adjustable using keys on the power module or RS232C interface
- Long maintenance-free period of operation



Dimensional drawing for the COOLPAK 6000 HMD/6200 HMD

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data

		COOLPAK			
		6000 HMD		6200 HMD	
		50 Hz	60 Hz	50 Hz	60 Hz
Mains voltage (3 phase)	V	400 ± 10%	460 ± 10%	200 ± 10%	200 - 230 ± 10%
Helium system filling pressure at room temperature	barg	15	14	14	13
		For all other Technical Data, see COOLPAK 6000 H and 6200 H			

Ordering Information

	COOLPAK	
	6000 HMD	6200 HMD
	Part No.	Part No.
Compressor type		
400 V/3-ph. 50 Hz or 460 V/3-ph. 60 Hz ± 10%	840000V6002	–
200 V/3-ph. 50 Hz or 200 – 230 V/3-ph. 60 Hz ± 10%	–	840000V6202
Flexible pressure line (for operating mechanically driven cold heads)		
9 m (31.5 ft) (High-pressure) FL9 HP-DN 20 (8f/8f)	840 217	
9 m (31.5 ft) (Low-pressure) FL9 LP-DN 32 (8f/8f)	840218V0032	
20 m (75.0 ft) (High-pressure) FL20 HP-DN 20 (8f/8f)	840230V2020	
20 m (75.0 ft) (Low-pressure) FL20 LP-DN 32 (8f/8f)	840231V2032	
Connection cable for the cold heads COOLPOWER 250 MD, 10 MD		
9,0 m (31.5 ft)	842 110	
20,0 m (75.0 ft)	842 112	
Power supply cable		
CEE plug, 32 A/6h, 3 pol+N+PE, 3,5 m (12.25 ft)	893 95	–
NEMA plug, L 16-20 P, 20 A/480 V, 3 pol+PE (AWG 12), 3,5 m (12.25 ft)	893 96	–
10 m (35.0 ft) with end splice (AWG 10)	840 111	
20 m (70.0 ft) with end splice (AWG 10)	840 112	
Accessories		
Tool-Kit	E 20004779	
Water cooling discharge throttle	E 840000133	
Spare parts		
Adsorber CP6000H	E 840002863	

General Accessories for Compressor Units COOLPAK 2000, 6000 H

Technical Data	Length	Connections on both sides (inside thread)	
		High pressure line (HD)	Low pressure line (ND)
Flexlines [1), 2)]			
FL 4.5 (1/2", 1/2") (= 1 Set)	4.5 m (14.76 ft)	1/2"	1/2"
FL 9.0 (1/2", 1/2") (= 1 Set)	9,0 m (29.53 ft)	1/2"	1/2"
FL 18.0 HP (1/2") (= single high pressure line)	18 m (59.06 ft)	1/2"	-
FL 18.0 LP (1/2") (= single low pressure line)	18 m (59.06 ft)	-	1/2"

Accessories for Flexlines	Connections (m = Outside thread, f = Inside thread)	
Adaptor for flexlines		
AD (1/2" m, 3/4" f)	1/2" m	3/4" f
AD (1/2" f, 3/4" m)	3/4" m	1/2" f
90°-Elbow 1/2" for flexlines	1/2" m	1/2" f
Coupling 1/2" for interconnecting two 1/2" flexlines	1/2" m	1/2" m
Coupling 3/4"	3/4" m	3/4" m

	Gas Distributors (required quantity)	Gas Manifold – Connections	
		At the compressor (Inside thread)	At the cold head (Outside thread)
Gas manifold (1 piece each)			
GD 2 (for dual operation) [2)]	2	1/2"	2 x 1/2"
GD 4 (for up to quad operation) [2)]	2	1/2"	4 x 1/2"

Ordering Information

General Accessories	Part No.
Flexlines [1), 2)]	
FL 4.5 (1/2", 1/2") (= 1 Set)	892 87
FL 9.0 (1/2", 1/2") (= 1 Set)	892 88
FL 18.0 HP (1/2") (= single high pressure line)	840 203
FL 18.0 LP (1/2") (= single low pressure line)	840 204
Adaptor for flexlines	
AD (1/2" m, 3/4" f)	892 89
AD (1/2" f, 3/4" m)	892 90
90°-Elbow 1/2" for flexlines	891 73
Coupling 1/2" for interconnecting two 1/2" flexlines	891 71
Gas manifold (1 piece each)	
GD 2 (for dual operation) [2)]	840 253 (2x)
GD 4 (for up to quad operation) [2)]	840 254 (2x)
Connection cable for linking cold head and compressor unit [2)]	
Power supply cable 4.5 m (14.76 ft)	E400 000 323
Power supply cable 18 m (59.06 ft)	840 002 964V0018
Extension cable for linking cold head and compressor unit [2)]	
EL 4.5 (4.5 m / 14.76 ft)	893 74

All flexible pressure lines, adaptor pieces, bends, isolating pieces, line couplings and gas manifolds are equipped with self-sealing Aeroquip fittings and filled in the factory with high-purity helium gas (purity: 99.999%). The filling pressure is 16 barg.

[1)] Minimum bending radius: 30 cm (11.81 in.).

[2)] Only suited for pneumatically driven cold heads and cryo pumps.

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Notes

Accessories for Cryo Pumps / Cryogenics

Controllers and Monitoring Units for Cryo Pumps

CRYOVISION

Optional Display Unit for COOLVAC iCL Cryo Pumps with COOL.DRIVE pump controller

Advantages to the User

- Visualisation of all *iClassicLine* cryo pump control processes with COOL.DRIVE integrated control unit via the integrated 7" (177.8 mm) touchscreen.
- Interface to customer's system controller for single or multiplex operation for cryo pumps from the iClassicLine range
- Output of measurement signals of all pressure and temperature sensors that are connected, along with the display of status reports of all pumps connected to the network
- Easily integrated within customer's system control

Typical Applications

- For automated operation of the COOLVAC cryo pumps of the iClassicLine

Control and Display Unit CRYOVISION



The intelligent control unit CRYOVISION automatically controls and monitors up to 10 COOLVAC iClassicLine cryo pumps.

Online monitoring, help functions and a service interface for ease of diagnosis and software updates via the built-in USB interface are just a few of its user-friendly features.

The CRYOVISION can be installed as a "stand alone system" or remote controlled via an interface.

Furthermore, an optional ProfiBus module is available for communication with the individual cryo pumps in single and multiplex operation via the ProfiBus.

Technical specifications

- Deployable as a desktop unit or as a mounted unit in a 19" rack
- Operation via 7" (177.8 mm) touchscreen or rear-sided interfaces

Scope of delivery

- Stylus
- Power supply connector
- Adhesive rubber feet for use as a desktop unit
- Installation kit for 19" rack installation
- Installation and operation manual

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data

		CRYOVISION
Operating voltage, ±10 %	V DC	24 [1]
Power consumption	W	11
Ambient temperature during operation	°C	+5 to +40
Dimensions (W x H x D)	mm (in.)	213 x 128.5 x 160 (8.39 x 5.06 x 6.3) [1/2 19" 3 HU]
Weight	kg (lbs)	1.9 (4.19)

[1] Provided via the CRYOVISION – COOL.DRIVE control line or optionally via an external, separate power supply.

Ordering Information

	CRYOVISION Part No.
Control and Display Unit CRYOVISION	**844231V0002**
Accessories	
Connection line CRYOVISION – COOL.DRIVE / COOL.DRIVE – COOL.DRIVE	
Length 5 m (16.4 ft)	**844231V2005**
10 m (32.8 ft)	**844231V2010**
20 m (65.6 ft)	**844231V2020**
Optional Interface Module	
COOLVAC ProfiBus Module ProfiBus – RS232 converter for COOL.DRIVE und CRYOVISION	**844000V1**

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

COOLVAC ProfiBus Module

Optional ProfiBus – RS232 converter for COOLVAC iClassicLine cryo pumps with COOL.DRIVE control unit and CRYOVISION display unit

Advantages to the User

- Direct control and monitoring of the current *iClassicLine* range of pumps with COOL.DRIVE controllers using the ProfiBus DP protocol
- Control and monitoring of all *iClassicLine* cryo pumps connected to the CRYOVISION display unit on the network using the ProfiBus DP protocol
- Control and monitoring of older cryo pumps from the ClassicLine range via the corresponding COOLVAC system controller
- Configured as a top-hat rail module for straightforward rack installation.

Typical Applications

- Conversion of Profibus DP commands into RS232 commands and of RS232 response messages into Profibus DP response messages for the RS232 interfaces of the COOL.DRIVE controllers on the iClassicLine cryo pumps and/or for the RS232 interfaces of the optional CRYOVISION display unit, and for the RS232 interface of the COOLVAC system controller of the earlier COOLVAC ClassicLine range of cryo pumps.

COOLVAC ProfiBus Module



The COOLVAC ProfiBus module enables the simple and straightforward control and monitoring of cryo pumps from the current *iClassicLine* range and/or the earlier ClassicLine range of pumps via the RS232 interface of the attendant control and display units COOL.DRIVE and CRYOVISION or COOLVAC SC via the Profibus DP standard.

The attendant GSD file is available on our homepage.

Technical specifications

- Plastic casing, ventilated
- Combination installation feet for top-hat and C-section rails
- ProfiBus DP slave interface module
- ProfiBus DP V0 conforming to IEC 61158-2 and IEC 61784 Type 3
- ProfiBus DP address range Hex $01…$7D selectable via switches and $7E selectable via software; corresponds to decimal numbers 1...126.
- ProfiBus terminating resistor can be cut in using a switch in the module
- ProfiBus connection via a 9-way D-sub socket
- RS232 interface lead connection using pluggable screw terminals

Scope of delivery

- ProfiBus module for top-hat rail installation
- 3m RS232 connection lead
- Installation and operating instructions

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Technical Data

COOLVAC ProfiBus Module

Operating voltage, ±10 %	V DC	24
Power consumption, approx.	mA	90
Ambient temperature during operation	°C	+5 to +40
Dimensions (W x H x D)	mm (in.)	22.5 x 100 x 115 (0.89 x 3.94 x 4.53)
Weight	kg (lbs)	0.13 (0.29)

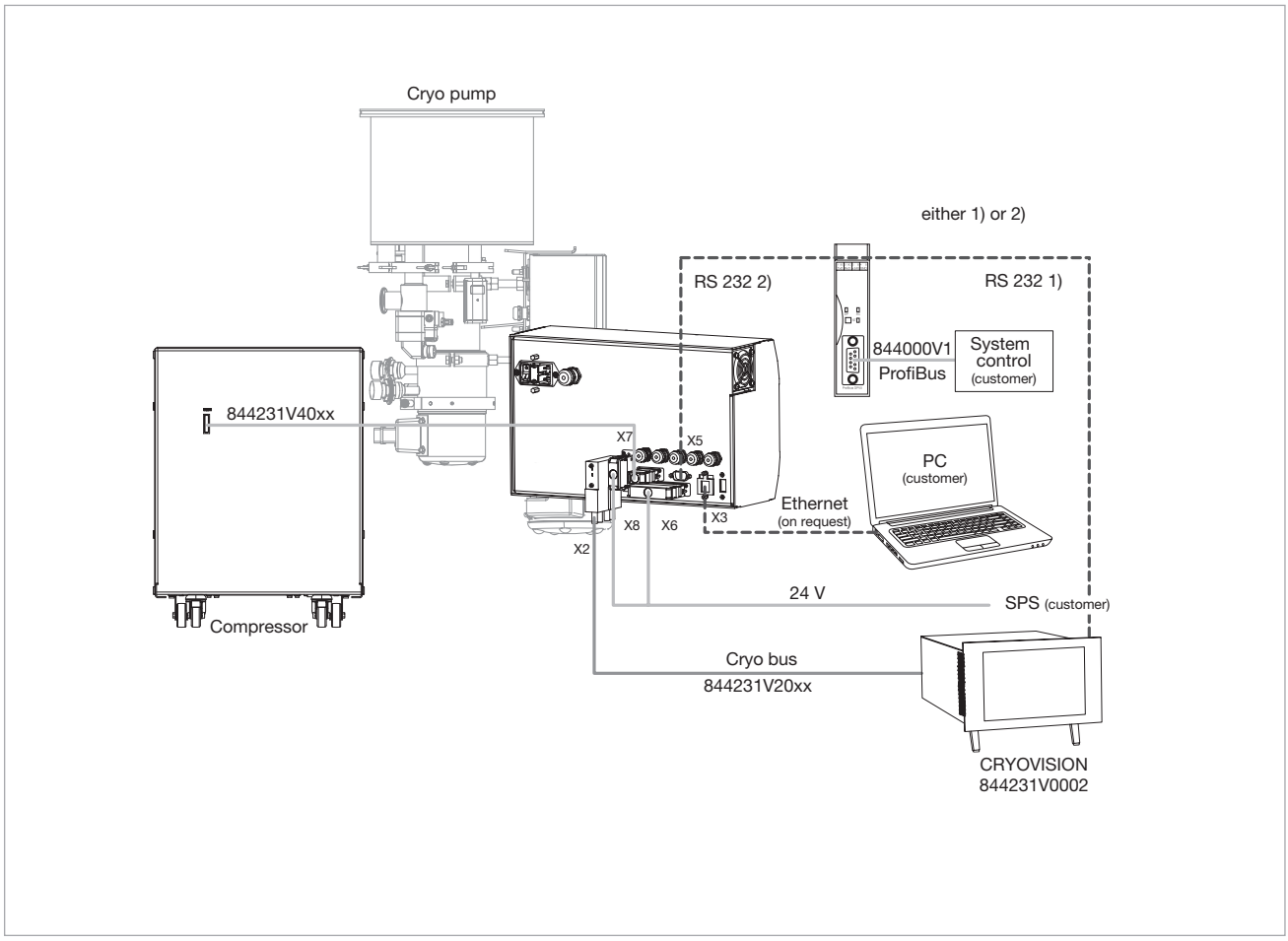
Ordering Information

COOLVAC ProfiBus Module

	Part No.
COOLVAC ProfiBus Module	**844000V1**

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

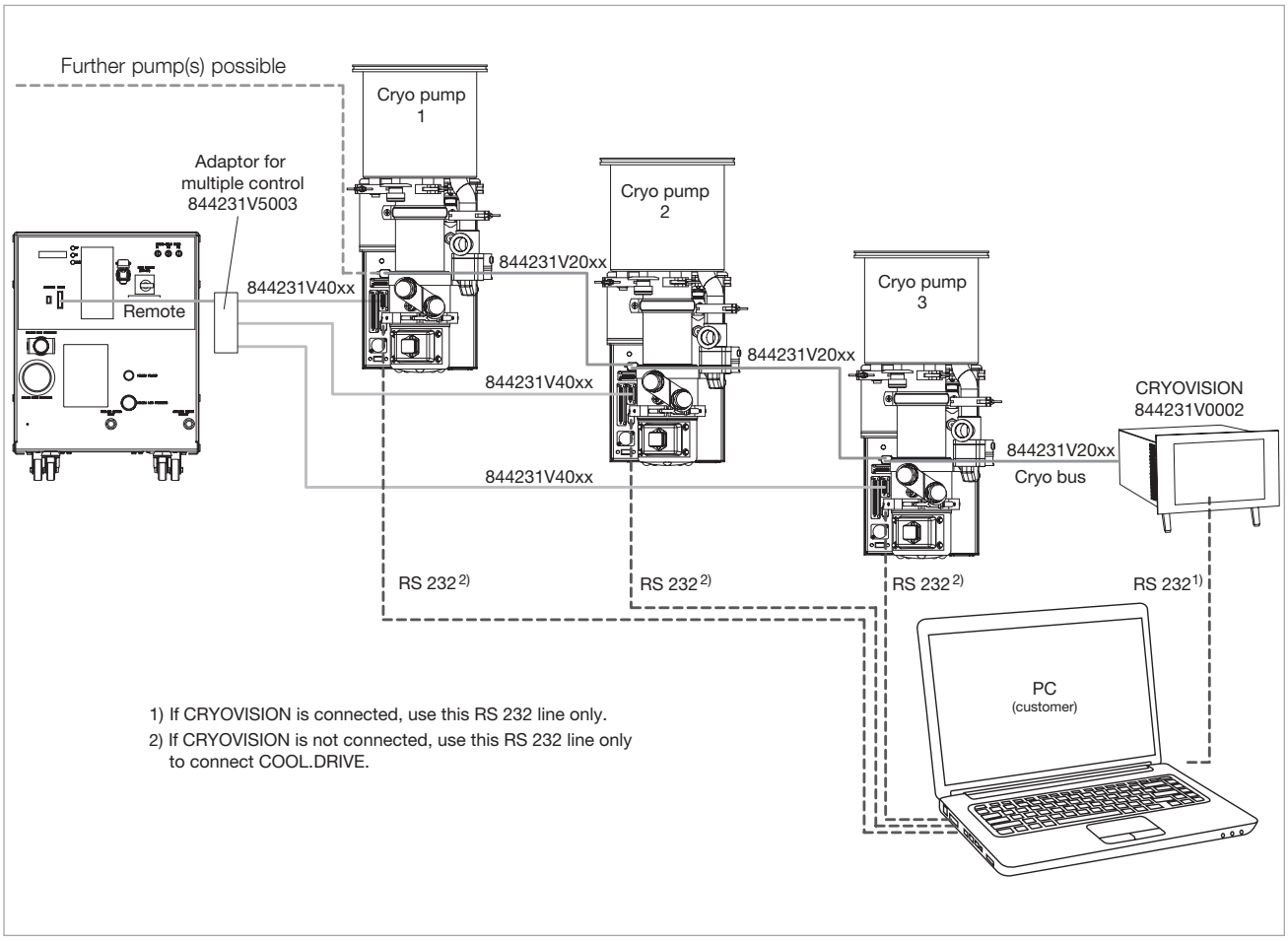
COOLVAC iClassicLine, Single System Configuration



Control options for one pump and one compressor unit

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

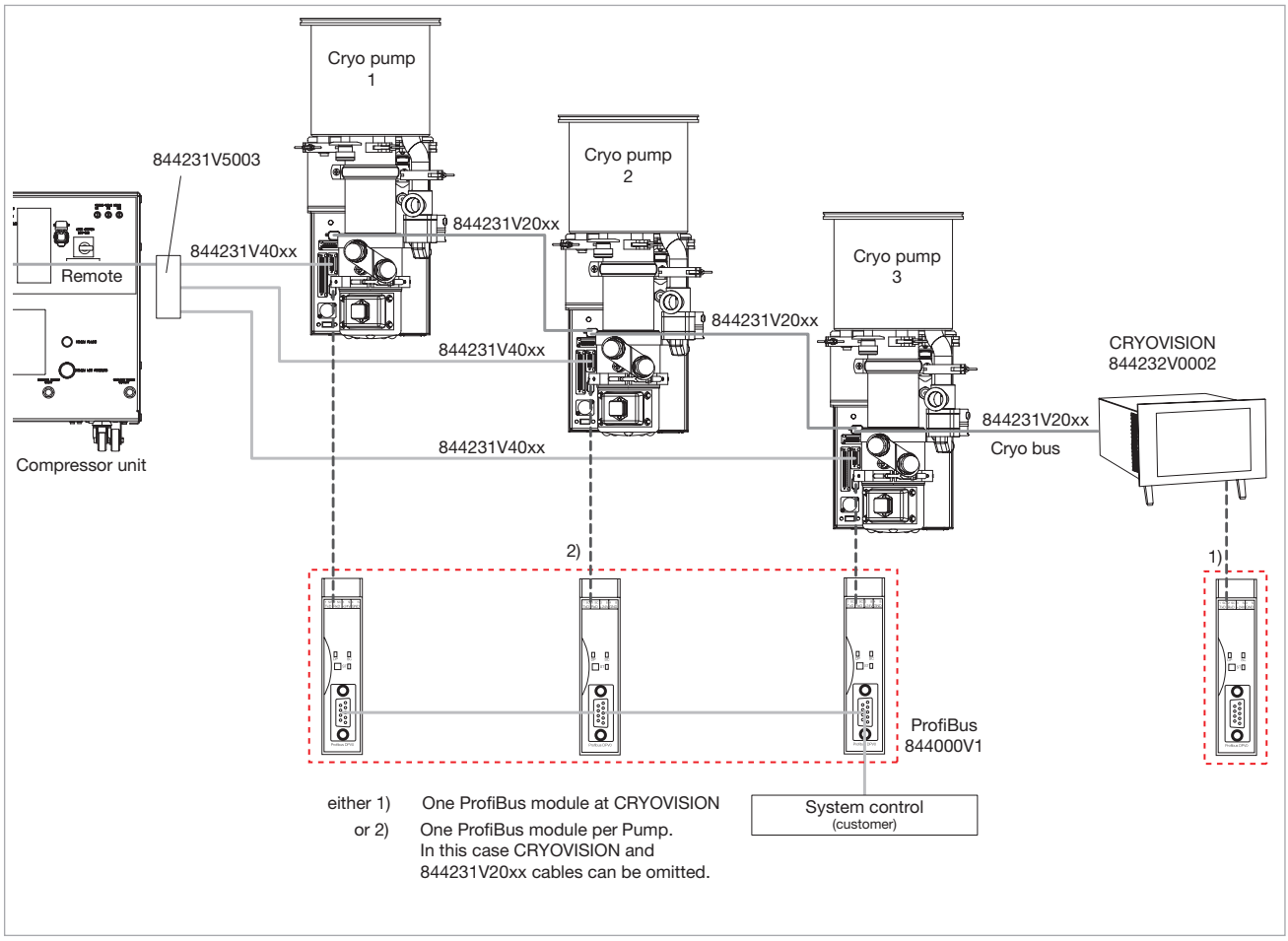
COOLVAC iClassicLine, Dual and Multiple System Configuration



Control options for three pumps

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

COOLVAC iClassicLine, Dual and Multiple System Configuration



Control options for several pumps with one built-in COOL.DRIVE each

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Low Temperature Measuring Instrument MODEL 211S



Advantages to the User

- Supports one silicon diode
- 3-digit LED display
- Temperature readout between 1 and 450 Kelvin
- Two trigger thresholds
- RS 232 C interface

Typical Applications

- Temperature measurements on cryostats
- Temperature measurements on cryo pumps for monitoring their operation and to control pump systems

Technical Data — MODEL 211S

Measurement current	**µA**	10
Display		LED, 5-digits
Temperature range	**K**	1.4 to 475
Resolution		0.001 K from 1.4 to 99.9 K 0.01 K from 100 to 475 K
Accuracy		±0.05 K from 1.5 to 99.9 K ±0.05 K from 100 to 475 K
Power supply voltage		5 V DC at 1 A through the supplied 100 – 240 V AC power adaptor
Trigger thresholds		2
Switched output		2 relays (n.c. and n.o.) 30 V DC at 1 A
Analog output **Voltage** **Current**	 **V** **mA**	 0 to 10 4 to 20
RS 232 C interface		a) Temperature output b) External adjustment of switching thresholds
Admissible ambient temperature	**°C (°F)**	+15 to +35 (+59 to +95)
Mechanical design/housing		Benchtop unit
Dimensions (W x H x D)	**mm (in.)**	96 x 48 x 166 (3.78 x 1.89 x 6.54)
Weight (including packaging), approx.	**kg (lbs)**	0.45 (1.0)

Ordering Information — MODEL 211S

	Part No.
Low temperature measuring instrument MODEL 211S	**844 110**
HV cable 2-way with plug, 10 m (35.0 ft) long [1]	**844 112**
HV cable 4-way with plug, 10 m (35.0 ft) long [2]	**844 113**
UHV cable 4-way with plug, 10 m (35.0 ft) long [2]	**844 114**
Silicon diode, type E, with connecting cable and micro plugs [4] **without current feedthrough**	**844000V5**
HV current feedthrough on a flange DN 25 KF, 2-way [5]	**E20019256**
UHV current feedthrough on a flange DN 16 CF, 4-way [6]	**500 217**

[1] Compatible with HV current feedthrough on a flange DN 25 ISO-KF (E20019256) and for older cryo pumps of type RPK.

[2] Compatible with current ranges BasicLine (BL) and BL LN_2.

[3] Compatible with UHV current feedthrough on a flange DN 16 CF (500217) and cryo pumps from the BL-UHV range.

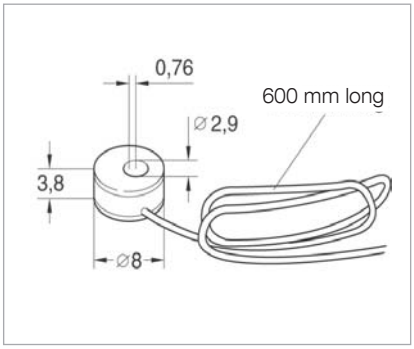
[4] Compatible with HV current feedthrough (E20019256).

[5] Compatible with 844000V5 and measurement line 844112.

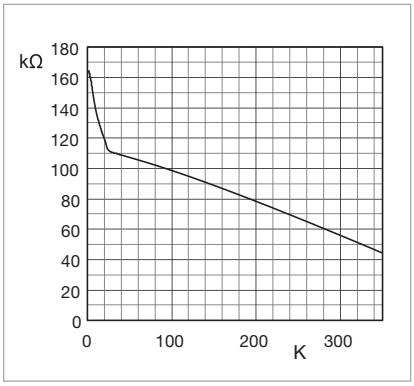
[6] Compatible with measurement line 844114.

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Temperature Sensor



Dimensional drawing for the silicon diode, type E



Standard characteristic of the silicon diode

In contrast to vapor pressure thermometers, electric temperature sensors can be used for continuous measurements within a wide range of temperatures.

Silicon diodes offer a negative temperature coefficient of resistance, i.e. their resistance drops as the temperature increases. The slope of the temperature/resistance characteristic and the absolute resistance are decisive regarding the suitability of these diodes. The slope determines the sensitivity of the sensor and a high electrical resistance permits accurate measurements while keeping the thermal load small (microwatts).

In systems which are degassed at high temperatures, silicon diodes can only be fitted after degassing has been completed.

The silicon diode type E matches the low temperature display unit.

Technical Data — Silicon Diode Type E

Temperature range	**K**	1.4 to 325
Temperature coefficient (dR/dT)		
qualitative		Negative in the entire temperature range
quantitative	**Ω/K**	Non-linear characteristic
Measurement current	**µA**	10
Bakeable to	**°C (°F)**	+60 (+140)

Ordering Information — Silicon Diode Type E

	Part No.
Temperature sensor	**844000V5**
Silicon diode with 4-way electrical feedthrough	**E6512948**

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Notes

Notes

Artisan Technology Group - Quality Instrumentation Guaranteed | (888) 88-SOURCE | www.artisantg.com

Notes

Sales and Service

Germany

Leybold GmbH
Bonner Strasse 498
D-50968 Cologne
T: +49-(0)221-347 1234
F: +49-(0)221-347 31234
sales@leybold.com
www.leybold.com

Leybold GmbH
Sales Area North
Branch Office Berlin
Industriestrasse 10b
D-12099 Berlin
T: +49-(0)30-435 609 0
F: +49-(0)30-435 609 10
sales.bn@leybold.com

Leybold GmbH
Sales Office South
Branch Office Munich
Karl-Hammerschmidt-Strasse 34
D-85609 Aschheim-Dornach
T: +49-(0)89-357 33 9-10
F: +49-(0)89-357 33 9-33
sales.mn@leybold.com
service.mn@leybold.com

Leybold Dresden GmbH
Service Competence Center
Zur Wetterwarte 50, Haus 304
D-01109 Dresden
Service:
T: +49-(0)351-88 55 00
F: +49-(0)351-88 55 041
info.dr@leybold.com

Europe

Belgium

Leybold Nederland B.V.
Belgisch bijkantoor
Leuvensesteenweg 542-9A
B-1930 Zaventem
Sales:
T: +32-2-711 00 83
F: +32-2-720 83 38
sales.zv@leybold.com
Service:
T: +32-2-711 00 82
F: +32-2-720 83 38
service.zv@leybold.com

France

Leybold France S.A.S.
Parc du Technopolis, Bâtiment Beta
3, Avenue du Canada
F-91940 Les Ulis cedex
Sales and Service:
T: +33-1-69 82 48 00
F: +33-1-69 07 57 38
info.ctb@leybold.com
sales.ctb@leybold.com

Leybold France S.A.S.
Valence Factory
640, Rue A. Bergès
B.P. 107
F-26501 Bourg-lès-Valence Cedex
T: +33-4-75 82 33 00
F: +33-4-75 82 92 69
marketing.vc@leybold.com

Great Britain

Leybold UK LTD.
Unit 9
Silverglade Business Park
Leatherhead Road
Chessington
Surrey (London)
KT9 2QL
Sales:
T: +44-13-7273 7300
F: +44-13-7273 7301
sales.ln@leybold.com
Service:
T: +44-13-7273 7320
F: +44-13-7273 7303
service.ln@leybold.com

Italy

Leybold Italia S.r.l.
Via Filippo Brunelleschi 2
I-20093 Cologno Monzese
Sales:
T: +39-02-27 22 31
F: +39-02-27 20 96 41
sales.mi@leybold.com
Service:
T: +39-02-27 22 31
F: +39-02-27 22 32 17
service.mi@leybold.com

Netherlands

Leybold Nederland B.V.
Floridadreef 102
NL-3565 AM Utrecht
Sales and Service:
T: +31-(30) 242 63 30
F: +31-(30) 242 63 31
sales.ut@leybold.com
service.ut@leybold.com

Switzerland

Leybold Schweiz AG
Hinterbergstrasse 56
CH-6312 Steinhausen
Warehouse and shipping address:
Riedthofstrasse 214
CH-8105 Regensdorf
Sales:
T: +41-44-308 40 50
F: +41-44-302 43 73
sales.zh@leybold.com
Service:
T: +41-44-308 40 62
F: +41-44-308 40 60
service.zh@leybold.com

Spain

Leybold Hispánica, S.A.
C/. Huelva, 7
E-08940 Cornellá de Llobregat
(Barcelona)
Sales:
T: +34-93-666 43 11
F: +34-93-666 43 70
sales.ba@leybold.com
Service:
T: +34-93-666 46 11
F: +34-93-685 43 70
service.ba@leybold.com

America

USA

Leybold USA Inc.
5700 Mellon Road
USA-Export, PA 15632
T: +1-724-327-5700
F: +1-724-325-3577
info.ex@leybold.com
Sales:
T: +1-724-327-5700
F: +1-724-333-1217
Service:
T: +1-724-327-5700
F: +1-724-325-3577

Brazil

Leybold do Brasil
Rod. Vice-Prefeito Hermenegildo Tonolli,
nº. 4413 - 6B
Distrito Industrial
Jundiaí - SP
CEP 13.213-086
Sales and Service:
T: +55 11 3395 3180
F: +55 11 99467 5934
sales.ju@leybold.com
service.ju@leybold.com

Asia

P. R. China

Leybold (Tianjin)
International Trade Co. Ltd.
Beichen Economic
Development Area (BEDA),
No. 8 Western Shuangchen Road
Tianjin 300400
China
Sales and Service:
T: +86-400 038 8989
T: +86-800 818 0033
F: +86-22-2697 4061
F: +86-22-2697 2017
sales.tj@leybold.com
service.tj@leybold.com

India

Leybold India Pvt Ltd.
T-97/2, MIDC Bhosari
Pune-411 026
Indien
Sales and Service:
T: +91-80-2783 9925
F: +91-80-2783 9926
sales.bgl@leybold.com
service.bgl@leybold.com

Japan

Leybold Japan Co., Ltd.
Headquarters
Shin-Yokohama A.K.Bldg., 4th floor
3-23-3, Shin-Yokohama
Kohoku-ku, Yokohama-shi
Kanagawa-ken 222-0033
Japan
Sales:
T: +81-45-471-3330
F: +81-45-471-3323
sales.yh@leybold.com

Leybold Japan Co., Ltd.
Tsukuba Technical Service Center
1959, Kami-yokoba
Tsukuba-shi, Ibaraki-shi 305-0854
Japan
Service:
T: +81-29 839 5480
F: +81-29 839 5485
service.iik@leybold.com

Malaysia

Leybold Malaysia
Leybold Singapore Pte Ltd.
No. 1 Jalan Hi-Tech 2/6
Kulim Hi-Tech Park
Kulim, Kedah Darul
Aman 09000
Malaysia
Sales and Service:
T: +604 4020 222
F: +604 4020 221
sales.ku@leybold.com
service.ku@leybold.com

South Korea

Leybold Korea Ltd.
3F. Jellzone 2 Tower
Jeongja-dong 159-4
Bundang-gu Sungnam-si
Gyeonggi-do
Bundang 463-384, Korea
Sales:
T: +82-31 785 1367
F: +82-31 785 1359
sales.bd@leybold.com
Service:
623-7, Upsung-Dong
Cheonan-Si
Chungcheongnam-Do
Korea 330-290
T: +82-41 589 3035
F: +82-41 588 0166
service.cn@leybold.com

Singapore

Leybold Singapore Pte Ltd.
42 Loyang Drive
Loyang Industrial Estate
Singapore 508962
Singapore
Sales and Service:
T: +65-6303 7030
F: +65-6773 0039
sales.sg@leybold.com
service.sg@leybold.com

Taiwan

Leybold Taiwan Ltd.
10F., No. 32, Chenggong 12th St.,
Zhubei City, Hsinchu County 302
Taiwan, R.O.C.
Sales and Service:
T: +886-3-500 1688
F: +886-3-550 6523
sales.hc@leybold.com
service.hc@leybold.com

Headquarter
Leybold GmbH
Bonner Strasse 498
D-50968 Cologne
T: +49-(0)221-347-0
F: +49-(0)221-347-1250
info@leybold.com

Leybold

www.leybold.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP