WELCH
by Gardner Denver

APPLIED VACUUM TECHNOLOGY

Vacuum Pumps and Systems

PROVIDING VACUUM INNOVATION WORLDWIDE

CATALOG 2021-2022

WWW.WELCHVACUUM.COM

Applied Vacuum Technology
Vacuum for laboratory and industry

Welch is a leading pump manufacturer of high-quality, durable vacuum products. Our extensive portfolio includes diaphragm pumps, rotary vane pumps, WOB-L® piston pumps, benchtop roots blower systems and turbomolecular pumps and systems, in addition to a wide range of accessories and vacuum hardware.

As a global leader in vacuum technology, we are renowned for our solution-oriented vacuum expertise. Serving numerous laboratories and equipment manufacturers around the world, we add value to our customers' businesses through unique end-use solutions and innovative OEM products. In addition to our state-of-the-art product portfolio, our customers and business partners benefit from our exceptional service, valuable training programs, and fast, experienced technical support. Our commitment to developing new technologies, engaging highly qualified specialists, and extensive testing in our in-house laboratories ensure that we meet all our customers' requirements – both now and in the future.

Welch Americas

- Founded 1904 as Sargent-Welch Scientific Co. Patented RVP designed
- 1990 Welch Vacuum Technology, Inc. spun off from Sargent-Welch Scientific Co.
- 1996 Welch Vacuum Technology, Inc. acquired by Thomas Industries, Inc.
- 1997 launch WOB-L vacuum pumps and Diaphragm vacuum pumps for Lab market
- 2003 launch Self-Cleaning Vacuum System for rotary evaporator application
- 2005 Thomas Industries, Inc. acquired by Gardner Denver, Inc.
- 2010 form Business Unit Welch-Ilmvac by acquiring ILMVAC, Inc. and merging with Welch
- 2015 Welch-Ilmvac renamed to Welch

Key product lines:

- Rotary Vane Vacuum Pumps
- Diaphragm Vacuum Pumps and Systems
- Wob-L Vacuum Pumps
- Benchtop Roots Blower Systems
- Vacuum Hardware

CRVpro

Your Robust Vacuum Pump

CRVpro 4,6,8,16,24,30

Discover the evolution of two-stage rotary vane vacuum pumps.
Built to last. Born to perform. And designed to simplify your work.
Meet the robust vacuum pump series – CRVpro.

APPLIED VACUUM TECHNOLOGY. ASK THE EXPERTS!
www.welchvacuum.com/crvpro

WELCH
by Gardner Denver

CONTENT

The business of WELCH is providing you with products and expertise to address your application needs.
The Welch product line offers a wide range of vacuum pumps – each expertly designed for optimum function in your application.
Consult your Welch representative to make vacuum work right for you.

Pump Technologies from Welch®

PUMP TECHNOLOGIES

Diaphragm

Diaphragm

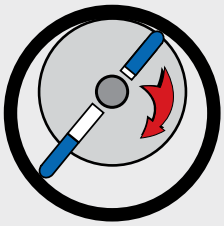
- Chemical Resistant
- Vacuum to 0.75 Torr
- Oil-Free
- DC Motor Option on select models

WOB-L Piston

WOB-L® Piston

- Moderate Vacuum/Pressure
- Wide Flow Range
- General Vacuum Usage
- Oil-Free
- Vacuum to 5 Torr

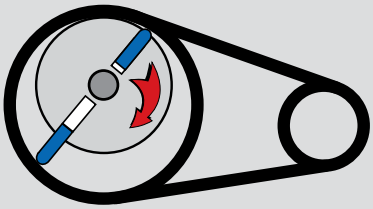
Rotary Vane



Rotary Vane

- Compact Oil-Seal Design
- Deep Vacuum
- Quiet
- Portable

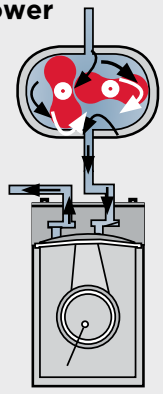
Belt Drive Rotary Vane



Belt Drive Rotary Vane

- Deep Vacuum
- Rugged Oil-Seal Design
- Good Chemical Tolerance
- Advanced Chemical Resistance Option

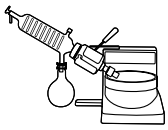
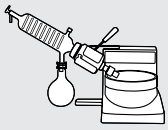
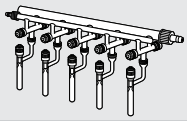
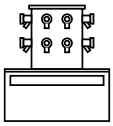
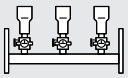
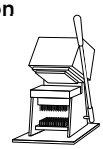
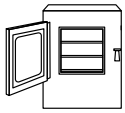
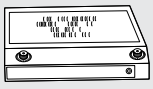
Vacuum Blower



Benchtop Roots Blower System

- Deep Vacuum
- Oil-Free
- Advanced Chemical Resistance
- Plug and Play

Pump Quick Selection Chart | For Common Lab Applications

APPLICATION	WELCH VACUUM PUMPS & SYSTEMS	FLOW RATE X VACUUM	UNIT PHOTO	MODEL	PAGE
Rotovap Volatiles, Low B.P. B.P. <100˚C Samples 0-5 Liter 	Self Cleaning System with regulator, gauge, condensate jars	35 l/min. 9 torr (12mbar)		202501	6 - 8
	DryFast PTFE Pump	25 l/min. 9 torr (12mbar)		2034B-01	
Rotovap DMF, Toluene, other non-volatiles Samples 0-5 Liter 	Self Cleaning System programmable w/condensate catchpots	35 l/min. 2 torr (2.7mbar)		202701	6 - 8
	DryFast Ultra PTFE Pump	35 l/min. 2 torr (2.7mbar)		2042B-01	
Concentrator DNA Pelleting SpeedVac® & CentriVap® Process Applications 	DryFast PTFE Pump	35 l/min. 9 torr (12mbar)		2044B-01	15
	DryFast Ultra PTFE Pump	35 l/min. 2 torr (2.7mbar)		2042B-01	
	Welch High Capacity PTFE Pump	100 l/min. 6 torr (8.0mbar)		2054B-01	
Vacuum Manifold Schlenk Line 	DuoSeal® & ChemStar® Pumps	25 l/min. <1 millitorr (1.3x10³ mbar)		1400B-01 or 1400N-01	10 - 11
	GEM® System	31 l/min. 100 millitorr (0.13mbar)		8890A-70	
Freeze Dryer 	CRVpro, Your Robust Vacuum Pump	158 l/min.		3081-01	16 - 17
	ChemStar Low RPM Pump	160 l/min.		1402N-01	
	Direct drive pump with integral oil filtration system	173 l/min.		8917A-80	
Filtration 	Welch Light Chemical Duty Pump	37 l/min.		2019B-01	18 - 19
	DryFast - Chemical Duty Pump	35 l/min.		2014B-01	
	WOB-L - Standard Duty Pump	45 l/min.		2546B-01	
Aspiration/Automation Cell Harvester Plate Washer 	WOB-L - Standard Duty Pump	100 l/min. 27.6 in. Hg (80mbar)		2567B-50	12 - 13
	DryFast - Chemical Duty Pump	70 l/min. 28.5 in. Hg (47mbar)		2047B-01	
Cell Culture Aspiration 	Welch Aspiration Station With gauge, regulator, 1200 ml autoclavable trap with liquid blockade system	34 l/min. 27.2 in. Hg (93mbar)		2515B-75	12 - 13
Vacuum Oven Drying Degassing 	WOB-L - Standard Duty Pump	100 l/min.		2581B-50	22 - 23
	DryFast - Chemical Duty Pump	35 l/min.		2042B-01	
	Welch High Capacity PTFE Pump	100 l/min.		2054B-01	
	CRVpro Pump	160 l/min.		3061-01	
Gel Dryer 	DryFast - Chemical Duty Pump	35 l/min.		2014B-01	14

Model Selectors

Look for the Model Selector Charts in each Application Section for further pump selection guidance.

Tunable Vacuum

Collegiate
2014

Research
2034 / 2044

Ultra
2032 / 2042

Specifications & Ordering - p. 28, 29

- **Built-in tuneable vacuum to control evaporation rate**
- **Three vacuum levels to meet your needs**
- **Rugged chemical duty construction to resist harsh vapors**

DryFast PTFE dry vacuum pumps for rotary evaporators include essential features to ensure efficient rotary evaporation. The DryFast tunable vacuum adjustment allows the user to optimize the vacuum for the solvent being evaporated - see Application Note below. The tunable vacuum adjustment can also be used to stop accidental bumping/ foaming.

Use 9 torr (12 mbar) DryFast models for common solvent evaporations. DryFast Ultra models offer 2 torr (2.7 mbar) ultimate vacuum to strip DMF fast along with other high boiling point and low boiling point solvents.

The rugged low maintenance oil free pumps have PTFE heads, perfluoroelastomer valves, and fluorinated plastic wetted surfaces, making DryFast a durable choice for solvent, acidic and basic vapors.

Model 2014 Collegiate Single stage PTFE diaphragm pump with excellent flow for evaporations of solvents with atmospheric boiling points to 80 °C. Maximum vacuum is 40 torr(53 mbar), 35 l/min. Strip ethanol at 35˚C

Models 2034 / 2044 Research Two stage PTFE diaphragm pumps provide tunable vacuum to 9 torr(12 mbar) – perfect for evaporation of solvents with atmospheric boiling points to 110 °C. Select Model 2044 (35 l/min) for evaporations up to 10 L flask. Strip DMF at 55˚C, toluene at 35˚C.

Models 2032 / 2042 DryFast Ultra Two stage PTFE pumps are excellent for all common evaporations, drawing a deep vacuum down to 2 torr(2.7 mbar) for solvents with atmospheric boiling points to 160 °C. Distills DMF rapidly at 35 °C. Select Model 2042 (35 l/min) for evaporations up to 10 L flask. Strip DMF at 35˚C, DMSO at 55˚C.

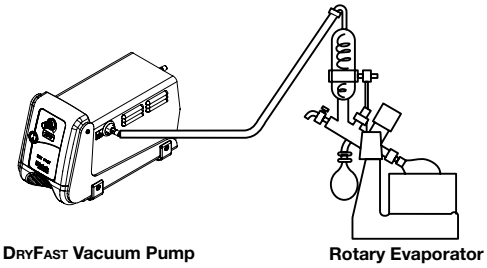
GREEN
By Design

CAPTURE™ vapor emissions from rotary evaporators with an integrated solvent recovery system - see p. 71.

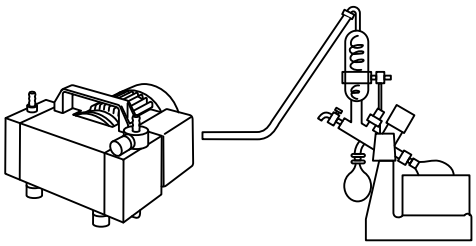
Application Note | DryFast®

Use tunable vacuum adjustment to increase vacuum until bubbles form in the evaporation flask – then back off slightly. Decrease vacuum using tunable adjustment to eliminate bumping in the evaporation flask.

Recommended Configuration For DryFast



Recommended Configuration for MPC



Model
MPC 110 E

Model
MPC 301 Z / MPC 302 Z

Model
MPC 601 T

Specifications & Ordering - p. 30 - 33

- **Wide vacuum and flow range to meet your needs**
- **Compact, user friendly design to fit in fume hood or on benchtop**
- **Rugged chemical duty construction to resist harsh vapors**

MPC PTFE dry vacuum pumps include essential features to ensure efficient rotary evaporation. With ultimate vacuum levels from 75 mbar(56 torr) to 1 mbar(0.75 torr), flow rates up to 138 l/min there is a pump for all rotary evaporator applications and sizes. All MPC models come with a gas ballast valve to handle high vapor loads and can be used to stop accidental bumping/foaming.

Use 8 mbar(6 torr) MPC two stage models for common solvent evaporations. MPC three stage models offer 2 mbar(1.5 torr) ultimate vacuum to strip DMF fast along with other high boiling point and low boiling point solvents. Corrosion-resistant wetted parts have PTFE heads, PEEK valves, and fluorinated pastic wetted surfaces, making MPC a durable choice for solvent, acidic and basic vapors.

Model MPC 110 E is a 2-headed, single stage PTFE diaphragm pump with excellent flow for evaporation of solvents with atmospheric boiling points to 80°C. Maximum vacuum is 50 mbar(38 torr), 16.7 lpm@50Hz. Strip ethanol at 35˚C

Models MPC 101 Z, 301 Z and 302 Z are 2-headed, two stage PTFE diaphragm pumps with excellent flow and vacuum for evaporation of solvents with atmospheric boiling points to 110°C up to 20 liter flasks. Model 302 Z uses a patented pump head design to provide excellent ultimate vacuum to <5 mbar, with a extra high flow rate in the application critical range. Strip DMF at 55˚C, toluene at 35˚C.

Models MPC 105 T, 105 T iQ-P, 201 T and 601 T are 4-headed, three stage PTFE pumps that are excellent for all common evaporations, drawing a deep vacuum down to 2 mbar(1.5 torr) for solvents with atmospheric boiling points to 160°C. Distills DMF rapidly at 35°C. Select Model MPC601T for evaporations up to 20 L flask.

GREEN
By Design

Vacuum regulators for mounting to the inlet of the MPC pump regulates the vacuum level and catchpots protect from ingestion ofliquids/particles- see p. 69, 75

Application Note | MPC 302 Z

Optimized construction of the pump heads allows the MPC 302 Z to reach higher pumping speeds in critical vacuum range leading to faster distillation compared to 8 mbar pumps.

Model Selector | Rotary Evaporators

Boiling Point, Atmospheric Pressure	80 °C		110 °C		160 °C		195 °C	
Example Solvents	Methylene chloride Acetone Chloroform Ethanol		Trichloroethylene n-Propyl alcohol Heptane Water Toluene Acetic Acid		1,1,2,2-Tetrachloroethane DMF Pentachloroethane		DMSO Polymers	
RotoVap Flask Volume	Pump Models	System Models	Pump Models	System Models	Pump Models	System Models	Pump Models	System Models
1 L	↑	↑	↑	↑	↑	↑	↑	↑
2 L			2034	↑	2032	↑	↑	↑
10 L			2044	2025	2042	↑	1400	8890A-70
20 L	2014	2025	2042	2026, 2027, 2028	2052, 2062	2026, 2027, 2028	1402	1402

Model 2025	Model 2026	Model 2027	Model 2028	Specifications & Ordering - p. 27

- **Anti-bumping / foaming feature with controlled evaporation rate**
- **Rugged corrosion resistant PTFE construction**
- **Self-cleaning for long life and repeatable performance**

Self-Cleaning Dry Vacuum Systems™ are complete vacuum solutions for rotary evaporation. All systems feature rugged corrosion resistant PTFE diaphragm pumps for low maintenance and long life. Optimize each solvent evaporation using handy vacuum adjustment

Also included with all models:

- **Digital or analog vacuum read-out**
- **Inlet and outlet traps to protect the pump and exhaust line from liquids**
- **Prominent emergency "bump stop" switch for bumping/foaming control**
- **Automatic self-cleaning purge at shutdown**

The self-cleaning feature and vacuum control technology contribute to Self Cleaning Systems' long diaphragm life. All models are 35 l/min at 60Hz (29 l/min. at 50Hz).

Model 2025 analog vacuum read-out, vacuum regulator, 9 torr(12 mbar) ultimate vacuum for fast stripping of most common rotary evaporation solvents. Fast stripping of rotary evaporator solvents with boiling point < 110 °C.

Model 2026 adjustable high vacuum. Analog vacuum read-out, vacuum regulator, 2 torr(2.7 mbar) ultimate vacuum for fast stripping DMF and other solvents with boiling point < 160 °C.

Model 2027 digital adjustable high vacuum. Digital vacuum read-out, vacuum regulator, 2 torr ultimate vacuum for fast stripping DMF and other solvents with boiling point < 160 °C.

Model 2028 programmable high vacuum. Five user entered programs with one or two solvents and times, keyboard or electronic dial vacuum selection, digital vacuum display with menu enabled programming, 2 torr (2.7 mbar) ultimate vacuum for fast stripping of DMF and other solvents with boiling point < 160 °C.

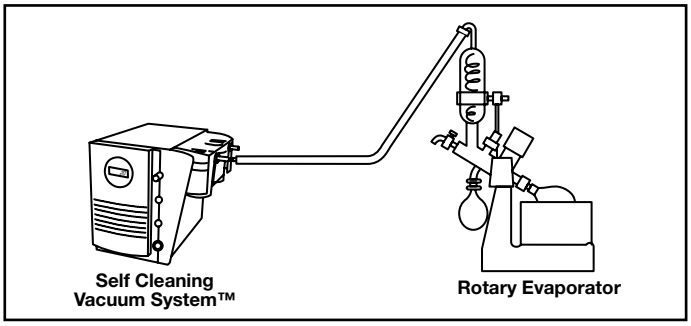
GREEN By Design

CAPTURE™ vapor emissions from rotary evaporators with an integrated solvent recovery system - see p. 71.

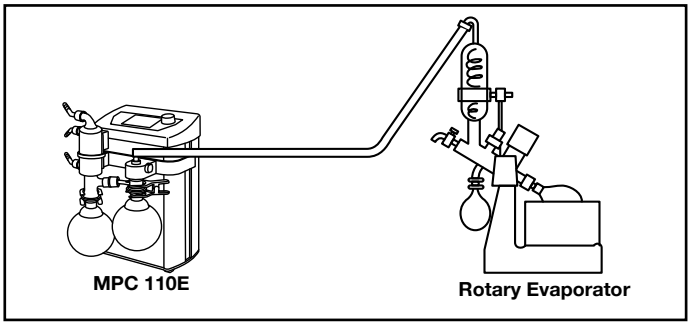
Application Note | Value of Self-Cleaning

The Self-Cleaning air purge cycle at the conclusion of each run maintains consistent performance and extends service intervals. This purge feature eliminates condensates in the pump's second stage and removes volatile substances before they can solidify. This purge resets the pump diaphragms to dry startup condition, enabling consistent solvent stripping rates run after run. Solidified substances can also be abrasive to the diaphragm, impairing performance and shortening diaphragm life.

Recommended Configuration



Recommended Configuration



Model
LVS 105 T - 10 ef

Model
LVS 301 Z

Model
LVS 310 Z

Model
LVS 610 T / LVS 610 T ef

Specifications & Ordering - p. 37 - 42

- **Modular design with integrated solvent recovery**
- **Rugged corrosion resistant PTFE construction**
- **Automated distillation options**

LVS systems are specifically designed for solvent distillation/evaporation applications. They include an oil-free chemical duty diaphragm pump (MPC) with optional control packages, liquid containment and exhaust vapor condenser. All wetted parts are made from high quality, chemically resistant materials with clear plastic coated glassware to allow solvent, basic and acid vapors to be pumped.

Model LVS 301 Z One fine control valve is used to regulate the vacuum by acting as a bleed valve. Model LVS302 Z is available with two control valves to regulate vacuum. Both models employ two-stage MPC pump having a flow rate of 38lpm@50Hz(41lpm@60Hz), with 8mbar(6 torr) ultimate vacuum for fast stripping toluene and other solvents with boiling point <110 °C.

Models LVS 210 T, LVS 310 Z and LVS 610 Z Employ a VCZ 521 vacuum controller with digital read-out to regulate automatically the vacuum level by opening and closing a solenoid valve. The user defines the vacuum and hysteresis levels to maintain vacuum of the process between the high and low control points. Flow rate@50Hz of LVS210T 33 lpm; LVS 310Z 38 lpm; LVS 610T 75 lpm(respectively 36 lpm, 41 lpm and 81lpm @60hz). All have 2mbar(1.5 torr) ultimate vacuum for fast stripping DMF and other solvents with boiling point <160 °C.

Models LVS 105 T-10 ef, LVS 210 ef, and LVS 610 ef. Come with Ecoflex control (ef) to continuously adjust the pumping speed of pump to match the vapor load of the process. This results in single point control to reduce bumping and foaming while maximizing evaporation rates. Built-in solvent library. Flow rate 50/60Hz for LVS 105 T - 10 ef is 20 lpm; LVS 210 ef 36 lpm; and LVS 610 ef 82lpm. ith 2mbar(1.5 torr). All have 2mbar(1.5 torr) ultimate vacuum for fast stripping DMF and other solvents with boiling point <160 °C.

GREEN By Design

LVS systems available with a digital controller and vapor emission recovery - see p. 37 - 42.

Application Note | Value of Ecoflex (ef) technology

Ecoflex control varies the speed of the pump constantly to maintain the user defined vacuum level. Ecoflex method is genuine single point(hysteresis-free control). Single point control results in up to 40% increase in evaporation rates with minimal bumping or foaming.

Model Selector | Rotary Evaporators

Boiling Point, Atmospheric Pressure	80 °C		110 °C		160 °C		195 °C	
Example Solvents	Methylene chloride Acetone Chloroform Ethanol		Trichloroethylene n-Propyl alcohol Heptane Water Toluene Acetic Acid		1,1,2,2-Tetrachloroethane DMF Pentachloroethane		DMSO Polymers	
RotoVap Flask Volume	Pump Models	System Models	Pump Models	System Models	Pump Models	System Models	Pump Models	System Models
1 L	↑	↑	↑	↑	↑	↑	↑	↑
2 L			2034		2032			
10 L			2044	2025	2042		1400	8890A-70
20 L	2014	2025	2042	2026, 2027, 2028	2052, 2062	2026, 2027, 2028	1402	1402

OIL-FREE VACUUM MANIFOLD PUMP

Model
Chemstar Dry

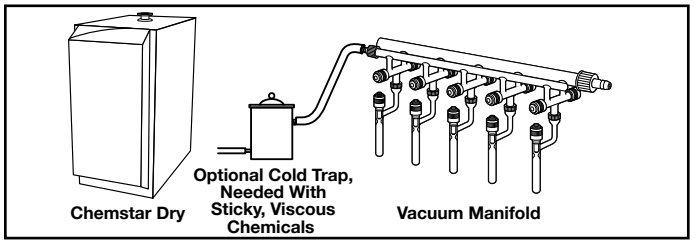
Specifications & Ordering - p. 48 - 49

- **Oil-free**
- **Chemical resistant construction**
- **Self-cleaning feature**

ChemStar® Dry vacuum system integrates a proprietary vacuum blower backed with a patented PTFE diaphragm pump. Software optimizes proprietary vacuum blower/PTFE diaphragm operation to allow plug and play operation. The result? The first chemical resistant dry pump alternative to oil-sealed pumps for Schlenk line eliminating oil-related maintenance work. Since the pumping system pulls a deep dry vacuum, there is no risk of oil-vapor backstreaming into your vacuum line to potentially contaminate the samples undergoing final drying.

Cold trapping is recommended to remove the risk of any sticky or viscous vapors condensing in the pump and building up over time shortening service interval. Avoid using PVC or silicone tubing for connections in your Schlenk line (see application note).

Cat. No.	Electrical	Ultimate Vacuum Pressure
2070B-01	115V, 60Hz, 1Ph	0.050 torr
2071B-01	115V, 60Hz, 1Ph	0.095 torr
2070C-02	230V, 50Hz, 1Ph with CE mark	0.090 mbar



TWO-STAGE ROTARY VANE VACUUM MANIFOLD PUMP

Model
CRVPro4

Specifications & Ordering - p. 52 - 53

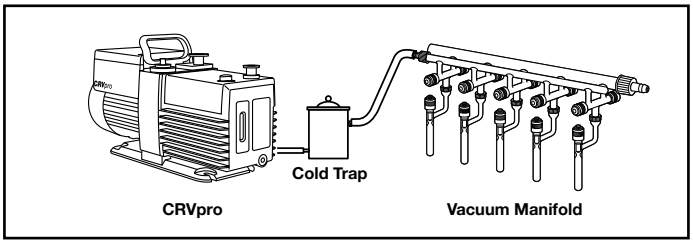
- **Cool running to extend oil life**
- **Internal surface protection to resist corrosion**
- **Large oil capacity to dilute contaminants**

CRVpro 4 direct-drive rotary vane pump is built for reliability to provide stable operation and long product lifespan with proper maintenance. The pumps are cool running due to enhanced air flow leading to pump running 10°C cooler than standard direct drive vane pumps. The lower temperature leads to reduced chemical activity within the pump and slows down rates of oil consumption.

Inside surface of the oil case has a PTFE coating and the outer surface of the pumping module has a black oxide coating. Both coatings act to slow metal corrosion and, when coupled with foreline traps, extend service interval.

The larger the oil capacity the more the dilution of chemical vapors that sublime from foreline cold trap into the pump oil. This minimizes the rates of oil breakdown and reduce chemical attacks within the pump.

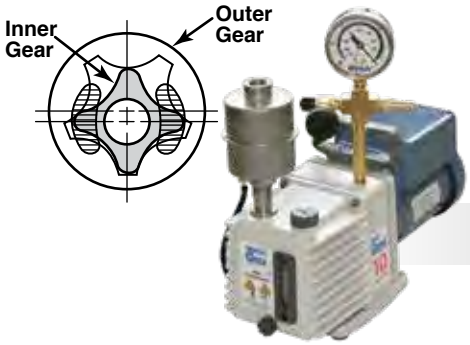
A foreline cold trap with temperature of -80°C or lower is always recommended with vacuum manifold systems.



Application Note | No PVC or Silicone Tubing

Welch doesn't recommend the use of PVC and silicon vacuum tubing in Shlenk line set-ups due to their poor chemical resistance to many common organic solvents (in particular methylene chloride, DMF and chlorinated solvents) present in the samples undergoing drying. Welch has observed sticky, gooey substances forming in the pump(see image on right) consisting of leached plasticizer or chemically degraded PVC/silicon tubing. These by-products from chemical attack of PVC and silicon tubing are carried in the vapor stream and eventually condense in the pumps as a sticky substances. These sticky substances shorten the service life of vacuum pump. Welch has found that gum rubber, flexible stainless steel or PTFE flexible tubing are more resistant to organic solvents removed from samples.

COMPACT GEAR VACUUM MANIFOLD PUMP



Model 8890A-70

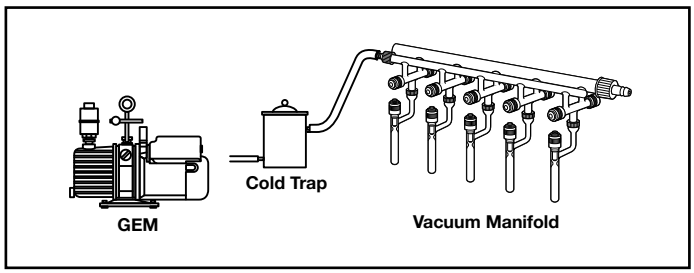
Specifications & Ordering - p. 51

- **"Right-sized" vacuum pump for vacuum manifolds**
- **Compact pump takes little space**
- **Rugged gear pump is tolerant of vapors**
- **Fully accessorized**

GEM® 8890A-70 high vacuum system is effective for vacuum manifold drying of large manifolds. With its 1.1 cfm (31 l/min.) flow and its ultimate vacuum of 0.1 torr (0.13 mbar), GEM dries 4 to 6 large sample vessels at once.

When operated according to Welch recommendations, the system has the optimum flow and vacuum for long-term durability on vacuum manifolds. Includes convenient vacuum regulator and gauge plus an exhaust oil recycler to capture oil mist ("smoke") from the pump exhaust and return it to the pump.

A foreline cold trap with temperature of -80 °C or lower is always recommended with vacuum manifold systems.



MOST DURABLE VACUUM MANIFOLD PUMP

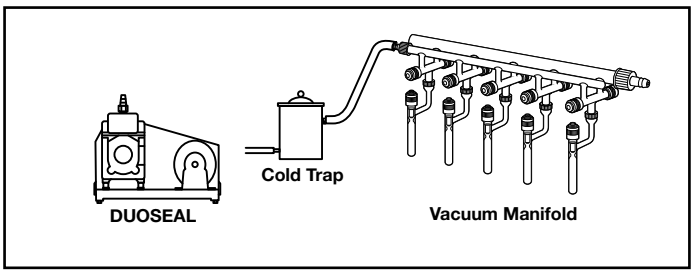
Model 1400/1400N

Specifications & Ordering - p. 54, 56

- **High contamination tolerance**
- **Best ultimate vacuum, <0.001 torr**
- **Low RPM for lower friction and wear**
- **Fewer moving parts increase pump durability**

DuoSeal® 1400 or ChemStar® 1400N high vacuum pumps are effective for drying using large vacuum manifolds. The <0.001 torr ultimate pressure results in superior drying performance for the most difficult samples. Belt-drive pumps are known for their durability. Low pump RPM reduces wear and minimizes temperature to reduce oil degradation. The large oil capacity dilutes contaminants for extended service life. For pumping corrosive gases, ChemStar 1400N also incorporates corrosion-resistant components for superior performance.

A foreline cold trap is always recommended when pumping on vacuum manifolds. Requires but does not include exhaust filter. See page 70 for filter accessories.



Application Note | Vacuum Manifolds

Vacuum manifolds are commonly used for the final drying of samples removed from a rotary evaporator. Organic solvents and/or acids left behind during the distillation process are removed over several hours or more depending on the sample size. A foreline cold trap (see p. 69) is always recommended to minimize the ingestion of the solvents. An acid neutralization trap is also recommended between the cold trap and the pump when strong acids are present in the sample. When the drying is finished for the day, it is very important to either turn the pump off and remove/clean the trap or isolate the trap from pump using a valve. The reason for this is to prevent sublimation of condensed solids or vaporized liquids from the cold trap from recondensing in the pump.

The use of large capacity pumps (greater than 40 l/min.) on vacuum manifolds will actually shorten the oil change interval. This occurs because the larger pump will accelerate the sublimation process. The vapor flows through the trap too quickly to condense. When a large capacity pump is used, it is common to see at the end of a drying run that no condensables are in the trap because the chemicals have been drawn into the pump. There is a common misconception that a pump with a large pumping capacity will shorten the drying time. Due to tubing restrictions in the manifold and stopcock, this is not the case. Drying time differences between a large and a small pump occur only when the manifold system is leaky! Leaky vacuum systems should be repaired.

COMPACT STATION FOR ASPIRATION & PRESSURE TRANSFER

Model 2511

Specifications & Ordering - p. 45

- **Pumping capacity 11 l/min. @60 Hz**
- **Pressure transfer capability to 33 PSIG (3.3 x 10^5 Pascal)**
- **Automatic flow stop when 1.2 liter receiver full**
- **Lightweight, portable**

Versatile model 2511 standard duty, oil-free station is an economical, portable solution for aspirating, filtering or rinsing. Added accessories include 1.2 liter autoclavable, bleach resistant collection receiver, vacuum regulator and gauge, hydrophobic in-line filter, automatic shut-off when receiver is full. All wetted parts are treated for corrosion protection from moisture. Recommended for aspirating aqueous solutions including buffers, but not for acidic, basic or organic vapors or gases.

See p.78 for hand held pipettor and other aspiration accessories.

HIGH FLOW FOR CELL CULTURE ASPIRATION

Model 2515

Specifications & Ordering - p. 45

- **High pumping capacity 34 l/min. @60Hz**
- **Bleach resistant**
- **Automatic flow stop when 1.2 liter receiver full**
- **Lightweight, portable**

High flow model 2515 standard duty, oil-free station is an economical, portable solution for aspirating or filtering. Station includes 1.2 liter collection receiver with port lid, vacuum regulator & gauge, and hydrophobic in-line filter.

Receiver is autoclaveable and bleach resistant. Automatic float valve shutoff protects pump when receiver is full. For vacuum filtration, receiver port lid accepts filter funnel with stopper.

All wetted parts are treated for corrosion protection from moisture. Recommended for aspirating aqueous solutions including buffers, but not for acidic, basic or organic vapors or gases.

See p.78 for hand held pipettor and other aspiration accessories.

Optional hands free On/Off foot switches plug directly into the power source outlet.
See page 78 for a full listing

Application Note | Aspiration Stations

The most common reason for vacuum pump failure in aspiration applications is the ingestion of liquid into the pump mechanism. Liquids ingested into the pump mechanism will lead to the valves failing or a diaphragm rupturing. Welch Aspiration Stations integrate features that protect your pump and your application:

1. The Collection Receiver captures aspirated liquid and automatically shuts off flow to the pump when full.
2. The hydrophobic in-line filter further protects the pump from aerosol ingestion. Routinely empty the Collection Receiver to assure continuous aspiration for your application.

COMPLETE FLUID ASPIRATION SYSTEM

Model
Biovac 106

Specifications & Ordering-
See table below

- **Autoclavable 4-liter polypropylene collection bottle**
- **HandVac pipettor**
- **Automatic flow-stop when receiver full**
- **0.22 micron hydrophobic biofilter**

Biovac 106 is a complete aspiration system for the safe and precise aspiration of biological fluids. An integrated chemical resistant diaphragm pump provides the vacuum source to the HandVac pipettor.

To the HandVac pipettor, different pipettes, glass tips and Pasteur pipettes may be connected for easily and precisely removing fluids from slides, Petri dishes, cell culture containers etc. These fluids are transferred via suction to a collection bottle.

The collection bottle has an automatic flow -stop when receiver is full. A biofilter is in-line between collection bottle and pump to prevent bio-aerosols from entering the pump and exhausting into the room. The complete system provides maximum personal protection.

Biovac 106 includes HandeVac pipettor as standard.
CAT No. 112580

ASPIRATION SYSTEM ON MOBILE CART

Model
Fluivac 105

Specifications & Ordering
See table below

- **Large 5 liter coated glass collection bottle**
- **Easily rolled to location needed**
- **Automatic float valve when receiver full**
- **0.22 micron hydrophobic biofilter**

Fluivac 105 is suitable for aspirating large amounts of liquid in laboratory or industrial applications. The system consists of mobile cart with handle, 5 liter coated glass collection bottle, high capacity chemical duty diaphragm pump, biofilter, float valve and tubing. Glass collection bottle is autoclavable.

The handle telescopes down to reduce the storage space requirement when not in use. Tubing supplied 3/8 in.(8 mm) I.D. and is 5 m(16.4 ft) with plastic pipette tube at suction end. On-off switch is mounted on the diaphragm pump.

Model	Biovac 106	Biovac 106	Biovac 106	Fluivac 105
Pump Speed cfm (l/min) @60 Hz	0.6 (16)	0.6 (16)	0.6 (16)	2.7 (76)
Pump Speed m^3/hr (l/min) @50 Hz	0.72 (12)	0.72 (12)	0.72 (12)	3.8 (63)
Ult Vacuum Pressure torr (mbar)	75 (100)	75 (100)	75 (100)	75 (100)
Fluid Reservoir	2 L Glass	4L Polypro-pylene	4L Polypro-pylene	5L Autoclav-able Plastic
Gauge and Regulator	No	No	Yes	No
Pipette Included	Yes	Yes	Yes	No
Foot Control	Yes	Yes	Yes	No
Cart Mounted	No	No	No	Yes
Dimensions in (mm)	13.5x14.3x7.8 (342x636x197)	15.6x14.3x7.8 (395x636x197)	15.6x14.3x7.8 (395x636x197)	13.4x11.8x23.8 (340x300x605)
Weight lbs (kg)	18 (8)	18 (8)	18 (8)	31 (14)
Ordering Information				
115/230V, 50/60 Hz(1)	112037	112037-04	112037-01	—
115V 60 Hz with US Plug	—	—	—	112039-01
230V 50/60Hz with CEE Plug	—	—	—	112039

Application Note | Aspiration Stations

The most common reason for vacuum pump failure in aspiration applications is the ingestion of liquid into the pump mechanism. Liquids ingested into the pump mechanism will lead to the valves failing or a diaphragm rupturing. Welch Aspiration Stations integrate features that protect your pump and your application:

1. The Collection Receiver captures aspirated liquid and automatically shuts off flow to the pump when full.
2. The hydrophobic in-line filter further protects the pump from aerosol ingestion. Routinely empty the Collection Receiver to assure continuous aspiration for your application.

Model 2014

Model MPC 301 E

Model 2042

Model MPC 302 E

Specifications & Ordering - p. 28, 31

- **Fast results with crack-free gels**
- **Oil-free solution**
- **Operate gel dryer and concentrator with one pump**

Vacuum gel dryers are commonly used to dry sequencing gels due to their large surface area. To dry sequencing gels crack-free requires steady vacuum to 28 in. Hg(65 mbar). Harsh chemicals are evolved from vacuum gel dryers so a chemical duty diaphragm vacuum pump is necessary with flow rate of 35 lpm. A liquid trap or catch pot in-line is necessary to collect condensate that forms as hot vapors come off the gel dryer and condense in-line. These condense vapors need to be collected in the liquid trap so they are not ingested into the diaphragm pump. A 2 liter filtering flask can be used as a liquid trap.

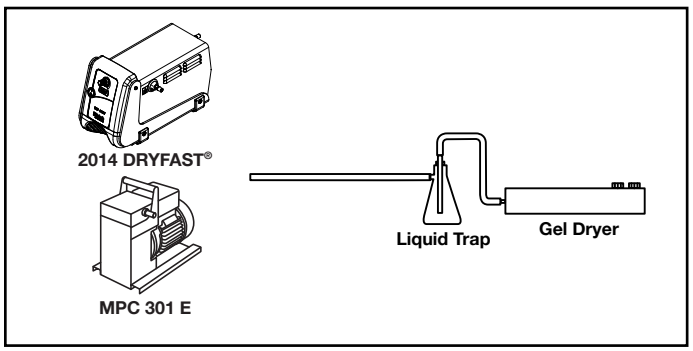
Model 2014 DRYFAST Single stage chemical duty diaphragm pump with excellent 35 lpm flow at 60Hz and vacuum to 28.3 in Hg(53 mbar). The rugged, low maintenance oil-free pump has one PTFE head, perfluorelastomer valves, and fluoroplastic wetted surfaces that make it suitable for drying electrophoresis gels.

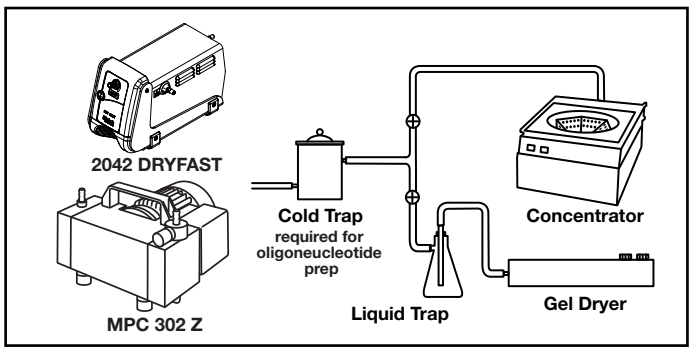
Model MPC 302 E Single stage chemical duty diaphragm pump with excellent 58 lpm flow at 50Hz and vacuum to 40 mbar(28.7 in Hg). The rugged, low maintenance oil-free pump has one PTFE head, PEEK valves, and fluoroplastic wetted surfaces that make it suitable for drying electrophoresis gels.

Vacuum gel dryers and concentrators are sometimes found together in life science laboratories. Laboratories that are short of space find it convenient to use one vacuum pump for both devices. One chemical duty diaphragm vacuum pump can be used to serve the two devices by assembling a basic manifold with tubing and two in-line valves. A concentrator needs a deeper vacuum to evaporate solvents compared to a gel dryer. Use selector table on following page to select the chemical duty diaphragm vacuum pump that will work with your particular concentrator application.

When the concentrator is in use, close the valve to the gel dryer, and vice versa. A liquid trap is necessary to remove the hot vapors that evolve from gel dryer and condense in the tubing.

For oligoneucleotide prep and biochemical/organic sample drying, a cold trap is recommended.





Application Note | Gel Dryers

Sometimes the silicone mat on the gel dryer will not settle to form a seal when pump is turned on and vacuum is applied to the gel dryer. Be sure that the mat is flexible so that it can form a seal. If it is not flexible, replace the mat.

Compatible with all Gel Dryers Including:

Model	Bio-rad	Hoefer
2014	583	GD 2000

Model 2044

Model 2042

Model MPC 302 Z

Model MPC 601 T

Specifications & Ordering - p. 29, 31, 32

- **Fast evaporation**
- **Low maintenance – no oil changes**
- **Reliable chemical duty diaphragm pump**

DNA pelleting drying times with an oil-free chemical duty diaphragm pump are equivalent to oil-sealed rotary vane pumps. Because of the lower maintenance of the diaphragm pump, these oil-free (dry) pumps have become the pump of choice. A diaphragm vacuum pump with flow rate of 35 lpm and ultimate vacuum pressure to 9 torr (12mbar) is needed to quickly dry the pellet. Recommended for most centrifugal concentrators including Thermo Speedvac® and Labconco Centrivap®.

Model 2044 DryFast® Two-stage chemical duty diaphragm vacuum pump with ultimate vacuum pressure of 9 torr (12mbar) and flow of 35 lpm@60Hz. The rugged, low maintenance oil-free pump has one PTFE head, perfluorelastomer valves, and fluoroplastic wetted surfaces that make it suitable for ethanol and water evolved during pellet drying.

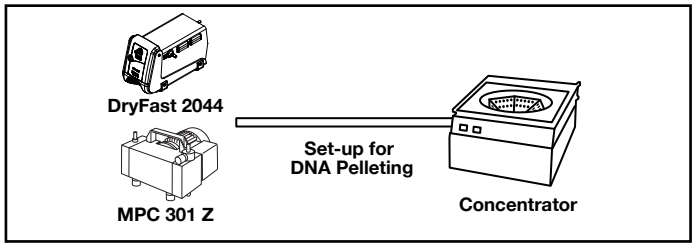
Model MPC 302 Z Two-stage chemical duty diaphragm vacuum pump with ultimate vacuum pressure of < 5 mbar (3.8 torr) and flow of 52 lpm@60Hz. The rugged, low maintenance oil-free pump has two PTFE heads, PEEK valves, and fluoroplastic wetted surfaces that make for ethanol and water evolved during pellet drying.

Oligoneucleotide prep and biochemical/organic sample drying times with an oil-free chemical duty diaphragm pump are equivalent to oil-sealed rotary vane pumps. A diaphragm pump with flow rate of 35 lpm and ultimate vacuum pressure to 2 torr (2.7mbar) is needed to dry samples quickly. As with an oil-sealed rotary vacuum pump, the chemical duty diaphragm vacuum pump paired with a cold trap of at least -50°C is necessary. The chemical duty diaphragm pump eliminates oil changes, frequent repairs, and oil mess. Chemical duty diaphragm vacuum pumps have the chemical resistance to handle aggressive chemicals such as TFA, HCL, formic acid, and acetic acid.

Model 2042 DryFast® Ultra Two-stage chemical duty diaphragm vacuum pump with ultimate vacuum pressure of 2 torr (2.7 mbar) and flow of 35 lpm@60Hz. The rugged, low maintenance oil-free pump has two PTFE heads, perfluorelastomer valves, and fluoroplastic wetted surfaces that make it suitable for the aggressive chemical vapors evolved during oligoneucleotide prep and biochemical/organic sample drying.

Model MPC 601 T Three-stage chemical duty diaphragm vacuum pump with ultimate vacuum pressure of 2 mbar (1.5 torr) and flow of 81 lpm@60Hz. The rugged, low maintenance oil-free pump has four PTFE heads, PEEK valves, and fluoroplastic wetted surfaces that that make it suitable for the aggressive chemical vapors evolved during oligoneucleotide prep and biochemical/organic sample drying.

Process large volume or sample count evaporations with ease using high capacity chemical duty pumps. Minimum flow of 65 lpm and ultimate vacuum to 2 torr (1.5 mbar) are recommended. See selector table below for model for recommendations.



Model Selector | Centrifugal Concentrator Pumps & Traps

Application	Sample Load	Refrigeration	Model
DNA Pelleting	<1 ml, up to 24 tubes	Refrigerated trap optional	DryFast® 2044
	≥1 ml, ≥24 tubes		2054
Oligonucleotide Preps	2-4 ml, up to 60 tubes	-55 °C Refrigerated trap highly recommended	DryFast® 2042
	≥4 ml, ≥60 tubes		2052
Biochemical/Organic Samples	<5 ml, up to 60 tubes	-55 °C Refrigerated trap required	DryFast® 2042
	≥5 ml, ≥60 tubes		2052
Biochemical or large samples	<50 ml, up to 6 tubes;	-55 °C Refrigerated trap required	DryFast® 2042
	≥50 ml, ≥6 tubes		2052

ROBUST FREEZE DRYER PUMP

Model
CRVpro 8

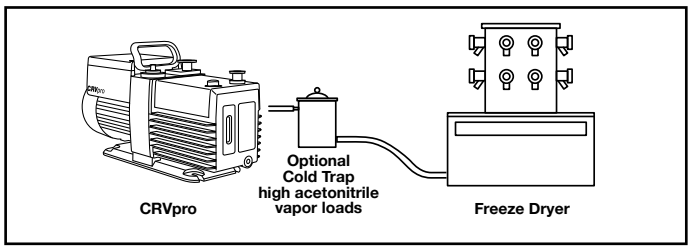
Specifications & Ordering - p. 52-53

- **Cool running to extend oil life**
- **Internal surface protection to resist corrosion**
- **Large oil capacity to dilute contaminants**

CRVpro direct-drive rotary vane pumps are built for reliability to provide stable operation and long product lifespan with proper maintenance. The pumps are cool running due to enhanced air flow leading to pump running 10°C cooler than standard direct drive vane pumps. The lower temperature leads to reduced chemical activity within the pump and slows down rates of oil consumption.

Inside surface of the oil case has a PTFE coating and the outer surface of the pumping module has a black oxide coating. Both coatings act to slow metal corrosion to extend service interval. Larger the oil capacity the more the dilution of chemical vapors that sublime from freeze dryer's condenser into the pump oil. This minimizes the rates of oil breakdown and reduce chemical attacks within the pump.

For high acetonitrile vapor loads, add a cold trap operating at -75 °C or colder. See p. 70 for exhaust filter options.



ACIDIC/ORGANIC VAPOR FREEZE DRYING

Model
8917A-80

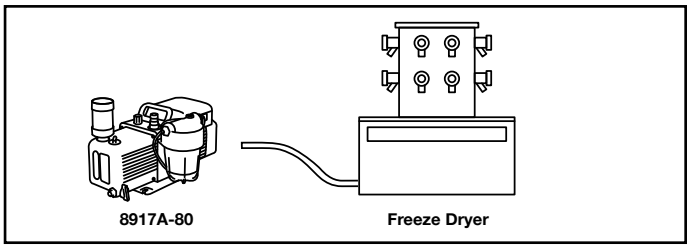
Specifications & Ordering - p. 51

- **Holds up to harsh chemicals used in proteomics and combinatorial chemistry**
- **System includes continuous acid neutralization and oil filtration**
- **Compact, quiet direct drive pump**

The Welch freeze dryer vacuum system is effective for freeze drying or concentrating by freeze dryer of samples including harsh chemicals such as TFA, acetonitrile, HBr and others. These chemicals quickly attack the vacuum pump oil of unprotected vacuum pumps. The 8917A-80 system includes a powerful 173 l/min. (143 l/min@50Hz) vacuum pump that is protected by an integral oil filtration system.

The oil filtration system neutralizes acids and removes solid reaction products from the oil. The system also has a large oil capacity of 1.3 liters that dilutes contaminants that mix with the pump oil during freeze drying runs.

The system includes Welch Gold Vacuum Pump Oil (see p. 72) which has excellent resistance to chemical attack.



Application Note | Freeze Dryers

Vacuum pump oil can be quickly compromised by the vapors from a freeze dryer. Once oil is chemically damaged, lubrication properties diminish and the vacuum pump quickly requires repair.

Organic solvents, acids, and other sublimated vapors often pass through the freeze dryer collector too rapidly to be effectively condensed. In general, better protection of your vacuum pump can be accomplished by

1. Using a low temperature cascade-refrigeration collectors.
2. Ensuring that your freeze dryer is operating vacuum tight. Too high a flow – augmented by system leakage – prevents the collector from operating efficiently.

Harmful vapor pass through is common in many freeze dryer systems. To maintain your lyophilizing process, select a vacuum pump designed to cope with harmful vapor ingress. See MODEL SELECTOR for the pump recommendations.

HIGH ORGANIC VAPOR LOADS

Model 8960

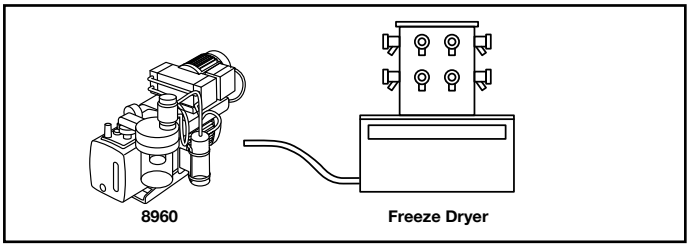
Model 8965/8970

Specifications & Ordering - p. 51

- **Degassing solvents trapped in oil case**
- **Laboratory Applications with chemical and corrossiove gases/vapors**

Eliminate the harmful vapors that destroy your pump in the most demanding vacuum applications. The Chemvac Combination Pump draws a deep, high-flow vacuum – suitable for freeze dry applications – with a powerful Rotary Vane Pump.

Harmful ingested fumes that would compromise the primary pump's oil are promptly degassed by Chemvac's secondary vacuum – a corrosion resistant PTFE diaphragm pump. This pumping system maintains high performance of the primary rotary vane pump, reducing maintenance and extending component life.



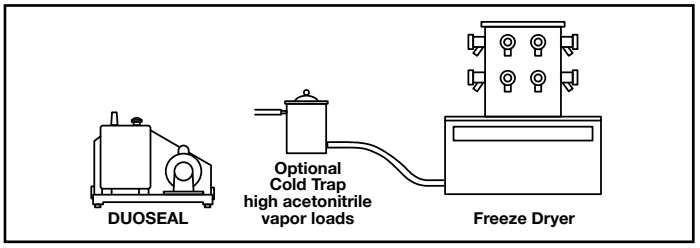
RUGGED PUMP FOR CORROSIVE VAPORS

Model 1402N

Specifications & Ordering - p. 56

- **Lower rotational speed for less wear and longer life**
- **Vital parts are corrosion resistant**
- **Large oil reservoir dilutes contaminants**

ChemStar® belt driven vacuum pumps are the most rugged Welch vacuum pumps for freeze drying applications. The design of these pumps makes them more tolerant of chemical contamination. The large 2.1 liters oil capacity dilutes contaminants. Lower belt drive RPM lowers operating temperature, thus reducing chemical activity. Lower RPM also results in less wear and longer operating life. Vital pump parts are corrosion resistant. The pump includes Welch Gold Oil which has excellent resistance to chemical attack.



Application Note | Freeze Dryers

Drug discovery labs are using freeze dryers for the final drying step when samples isolated by HPLC and LC include heat sensitive proteins and peptides. These samples are typically dissolved in a water, acetonitrile, and 0.1% TFA solution. Acetonitrile and TFA and its by-products will cause rapid breakdown of pump oil, changing its viscosity and leading to pump failure – sometimes after only a few runs.

There is often no way to prevent the ingestion of harsh chemicals into the pump. Three steps to minimize ingestion of harsh chemicals are:

1. Clean the freeze dryer's condenser after each freeze drying run to prevent sublimation of the frozen chemicals into the pump.
2. Size the pump to the freeze dryer. Pumping speed that is too high will shorten residence time in the condenser, reducing its trapping efficiency.
3. Spread the drying of multiple samples over time to evenly distribute the vapor load on the condenser.

CAUTION: For high acetonitrile vapor loads, add a cold trap operating at -75 °C or use a cascade system freeze dryer wih collector operating at -75˚C or colder.

Model Selector | Freeze Dryers

Freeze Dryer Size (volume)	Economy	Acidic/Organic Vapors	High Organic Vapors	Highly Corrosive Vapors
1, 2.5 L Drum Manifold	CRVpro 4	8917A-80	8960	1402N-01
4.5 L Drum Manifold	CRVpro 6	8917A-80	8965	1402N-01
6 to 12 L Drum Manifold	CRVpro 8	8917A-80	8965	1402N-01
12, 18 L Stoppering Tray Dryer	CRVpro 16	1376N-01	8970	1376N-01

Model
MPC 090 E

Model
2522

Model
2014

Specifications &
Ordering - p. 28, 30, 44

- **Flow rates available meet number of filter holders**
- **Range of built-in accessories and head/diaphragm materials**
- **Models for pressure filtration**
- **Type to meet your application and budget needs**

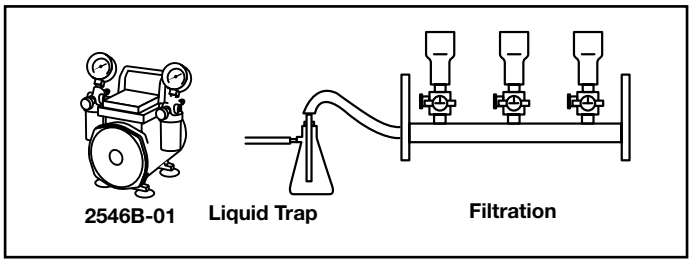
The Wob-l® oil-free vacuum pumps employ an aluminum piston with PTFE seal and are loaded with powerful features for vacuum or pressure filtration. The diaphragm pumps are available in different head/diaphragm materials to handle a range of chemical vapors evolved during filtrations. With these two pump mechanisms and range of materials available, Welch can offer a pump to fit your specific application and budget needs.
A modest vacuum of 40 torr (53 mbar) to 200 torr (266 mbar) is normally sufficient(26 in. Hg to 29.6 in. Hg) for most vacuum filtration applications. Free air displacement requirement for vacuum filtration is dependent on the filter size, leak rate, condition of the filter cake, and number of filter holders. Pressure filtration normally requires from 2 to 6 bar (30 PSIG to 88 PSIG).

Models 2522, 2534, 2546 These single headed, Wob-l vacuum pumps are standard duty dry pumps and are effective for filtering aqueous or buffer solutions that are not strongly acidic or basic. Flow ranges from 16 lpm to 45 lpm@60Hz and vacuum from 26 in. Hg (133 mbar) to 27.6 in. Hg (80 mbar). Features on these models include vacuum and pressure regulators with gauges, liquid trap at inlet with ball valve to prevent accidental ingestion of solution into pump, and a silencer on outlet for noise reduction.

Model 2567 A twin head Wob-l vacuum is a standard duty pump with a flow of 100 lpm@60Hz and vacuum to 27.6 in. Hg (80mbar). Configured with an inlet catch-pot, vacuum regulator/gauge and exhaust silencer, this pump can handle up to a 6 filter holder manifold.

Model MPC 090 E Diaphragm pump configured for filtering weak acid/base solutions. Pump comes with inlet regulator and catchpot. Flow of 16.7 lpm and ultimate vacuum of 27 in. Hg(100 mbar). Option available with power adapter to connect with a vehicle to permit use in field.

Models 2050, 2060 These Gemini diaphragm pumps are configured for lab or field usage to do sampling or filtration. Gemini pumps have polyaryamide heads and viton diaphragms, tubing and valves making them ideal with water, light organic solvents and weak acids/bases. Flow of 13 lpm and vacuum to 22 in. Hg (266 mbar). Model 2050 is pump only.Model 2060 comes with vacuum gauge/regulator assembly. Includes automobile power adapter for field use (12V DC to AC).



Application Note | Protecting vacuum pump from filtrate

The most common reason filtration pumps fail is because of accidental liquid ingestion into the pump. The filtrate collected in filtering flask overfills and filtrate is suctioned into the vacuum pump. Alternately, the funnel end located in the filtering flask is too close to the flask exit port. Welch recommends a catchpot or flask be located between the pump and the filtering flask to act as a liquid trap.

Model 2019

Model 2014

Model MPC 601 E

Specifications & Ordering - p. 28, 31

- **Flow rates available to meet number of filter holders**
- **Chemical resistant construction**
- **Vacuum regulation options**
- **Type to meet your application and budget needs**

Diaphragm vacuum pumps with chemical resistant construction are suitable for filtering organic solvents, acids and bases. For this reason, diaphragm pumps are commonly used in applications like filtering precipitate in synthesis reactions and solid phase extraction (SPE). Vacuum level for these models achieve a deep enough vacuum to create a pressure differential in filtering flask with atmospheric pressure to speed filtration. At the same time, the pumps are selected so as not to generate too deep a vacuum to lead to "boiling" of most filtrates collected in the filtering flask.

Model 2019 Economical, light weight, durable diaphragm vacuum pump with PTFE contact surfaces for filtering light organic solvents, weak bases and acid solutions. Material of construction is PTFE coated aluminum, PTFE liner for the diaphragm and fluorinated plastic inlet fitting. Maximum vacuum of 24 in. Hg (200 mbar). Flow of 37 lpm@60Hz. Pump can be used to pressurize up to 18 PSIG. Includes exhaust muffler and also hose fitting to channel exhaust fumes to a fume hood.

Models 2014, 2037 and 2047 DryFast® Chemical duty PTFE diaphragm pumps are effective for filtering organic solvents, acidic and basic solutions. These rugged oil-free pumps handle aggressive vapors since they are corrosion resistant with all PTFE head construction, PTFE diaphragm, fluoroplastic valves and fittings. Built-in vacuum regulation using a bleed valve mounted on front panel. Flow ranges from 35 lpm to 70 lpm@60Hz. Ultimate vacuum to 28.3 in. Hg (53 mbar).

Models MPC 301 E, 601 E and 602 E These one stage models of MPC chemical duty PTFE diaphragm pumps are effective for filtering organic solvents, acidic and basic solutions. The MPC models use PTFE and other fluorinated plastics for the wetted parts to allow aggressive solvent and acid vapors to be pumped. Flow ranges from 38 lpm to 70 lpm@50hz and ultimate vacuum pressure from 75 mbar (27.7 in. Hg) to 30 mbar (29 in. Hg). Optional vacuum regulators with gauges can be mounted on the inlet of the pump to regulate the vacuum level by way of a bleed valve.

Model Selector | Filtration

Filtration Solvent / Media	Chemical Examples	Vacuum Regulation	Number of Filters	Model
Aqueous Vapors	Suspended solids samples Food slurry analysis	Yes	1-2	WOB-L 2522
		Yes	1-4	WOB-L 2534
		Yes	1-6	WOB-L 2546
		Yes	6 funnel manifold	WOB-L 2567
Mild Chemical Vapors	Weak acid /base solutions Field environmental Samples	No	1	GEMINI 2050
		Yes	1	GEMINI 2060
Low-volume Organic Vapors	Alcohol Solutions Solid Phase Extractions	No	1	2019
Strong Chemical Vapors	Chlorinated solvents Strong acid /base solutions Ketones	Yes	1-2	DryFast 2014
		Yes	1-6	DryFast 2037
		Yes	6 funnel manifold	DryFast 2047

Model
MP 060 E

Model
MP 055 Z

Model
2534

Model
CRVpro 4

Specifications &
Ordering - p. 30, 34, 44, 52

- **Drying moist samples**
- **Fast pump-down of desiccator**
- **Oil-free options**

Vacuum desiccators are used frequently in laboratories for the removal of moisture in a sample, storing moisture/oxygen-sensitive samples under a vacuum or inert atmosphere, vacuum testing, and degassing/de-foaming samples. As a result of this wide range of uses, vacuum pump selection depends on desiccator volume, vapors removed from samples and vacuum level needed to protect sample.

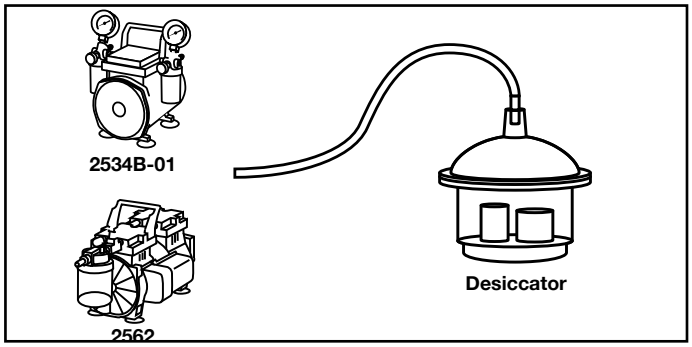
The volume of the desiccator needs to match the free air displacement of the pump to ensure a satisfactory pump down. Economical Wob-l® pump can be used for drying moist samples. Chemical duty diaphragm pumps are used for removing organic solvents and/or acid/bases from samples. CRVpro pumps are used for high vacuum applications where the desiccator is used for long term storage.

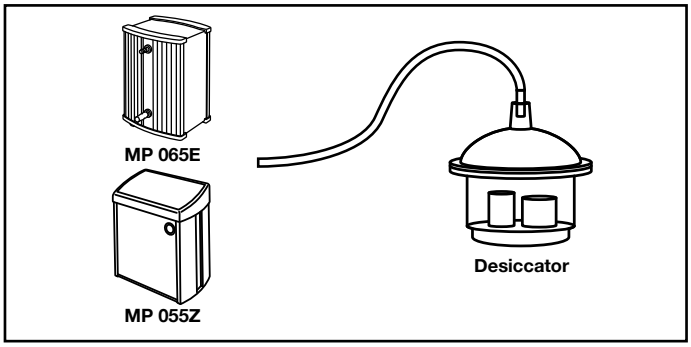
The common plastic and glass desiccators found in most laboratories will hold a maximum vacuum to 29 in Hg (31 mbar) for 24 hours. Some specialty manufacturers of glass and metal desiccators will rate their desiccators for long term high vacuum storage to $1x10^{-3}$ torr (1.3×10^{-3} mbar) and are capable of holding a vacuum at 27 in. Hg (100 mbar) for 5 years. Check with desiccator manufacturer on the vacuum rating to aid in using Welch's selector table.

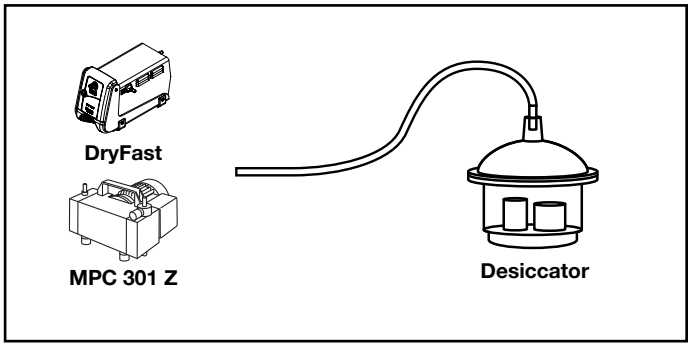
Models MP 065 E, MP 055 Z These standard duty diaphragm pump models are high performance and easy-to-use solution for small benchtop desiccators. These space saving pump models have small footprints and are also portable. Ultimate vacuum pressure on MP 065 E is 100 mbar (75 torr) and MP 055 Z is <5 mbar (3.8 torr). Optional regulators and gauge assemblies are available, see page 75.

Model 2534, 2562 These Wob-l piston pumps are standard duty pumps that pack a lot of performance in small size for use with small benchtop desiccators to cabinets. Model 2534 features vacuum and pressure regulators with gauges, liquid trap at inlet and a muffler and has ultimate vacuum pressure of 27.2 in. Hg (93 mbar). Model 2562 is a two stage pump with ultimate pressure vacuum of 29.6 in. Hg (10 mbar).

Model CRVpro 4 The two-stage direct-drive rotary vane pump are suitable for long term storage applications because it is capable of reaching ultimate vacuum pressure of 29.9+ in. Hg ($5x10^{-4}$ mbar/$4x10^{-4}$ torr). This robust vacuum pump is oil-lubricated to allow it to achieve this high vacuum.







Model 2019

Model 2034

Model MPC 302 Z

Model 2070/2071 Chemstar® Dry

Specifications & Ordering - p. 28, 31, 48

- **Drying samples containing solvents, acids, bases**
- **Fast pump-down of desiccator**
- **Oil-free options**

Oil-free chemical duty diaphragm vacuum pumps are commonly used with samples where organic solvent, base or acid vapors are evolved from sample during drying and/or degassing. Chemical duty diaphragm pumps use PTFE and other chemical duty materials for protection against damage from these vapors. Where a high vacuum is required, oil-free CHEMSTAR DRY or CRVpro direct drive pumps with in-line cold traps are recommended.

Model 2019 Economical, oil-less, light weight, durable diaphragm vacuum pump with PTFE coated aluminum, PTFE liner for the diaphragm and fluorinated plastic inlet fitting. Maximum vacuum of 24 in. Hg (200 mbar). Includes exhaust muffler.

Models MPC 090 E, 095 Z, 301 E, 301 Z, 302 Z and 601 E These oil-less chemical duty diaphragm vacuum pump are rugged, low maintenance oil-free pump PTFE heads, PEEK valves, and fluoroplastic wetted surfaces for handling the most aggressive chemical vapors. One-stage pump models MPC 090 E, 301 E and 601 E can reach ultimate vacuum pressure to 75 mbar (56 torr or 27.7 in Hg). Two-stage pump models 301 Z and 302 Z can reach ultimate vacuum pressure to <5 mbar (3.8 torr or 29.8 in Hg). Available with optional vacuum regulators and catchpots. See page 69 for details.

Model 2034 DRYFAST Chemical duty diaphragm pump will handle aggressive vapors since they are corrosion resistant with all PTFE head construction with all wetted surfaces made of fluoroplastic wetted. Built-in vacuum regulation using a bleed valve mounted on front panel. Ultimate vacuum pressure to 29.6 in. Hg (12 mbar/9 torr).

Models 2070, 2071 CHEMSTAR DRY ChemStar Dry vacuum system integrates a proprietary vacuum blower backed with a patented PTFE diaphragm pump. Software optimizes proprietary vacuum blower/PTFE diaphragm operation to allow plug and play operation. Vacuum to 0.050 torr (0.07 mbar) depending on model.

Model CRVpro 4 This two-stage direct-drive rotary vane pump is suitable for long term storage applications because it is capable of reaching ultimate vacuum pressure of 29.9+ in Hg ($5x10^{-4}$ mbar/$4x10^{-4}$ torr). In-line cold trap is recommended when pumping chemical vapors (see pages 69).

Model Selector | Desiccator

	Desiccator Type	Application	Ultimate Vacuum Pressure torr(mbar)	Model
Aqueous vapors	Benchtop	Process	70(93)	WOB-L 2534
		Storage	7.5(10)	WOB-L 2562
	Cabinet	Process	70(93)	WOB-L 2534
		Storage	7.5(10)	WOB-L 2562
	Benchtop to Cabinet	Storage	4x10-4(5x10-4)	CRVpro 4
Chemical vapors	Benchtop	Process	150(200)	2019
		Storage	9(12)	2034
	Cabinet	Process	150(200)	2019
		Storage	9(12)	2034
	Benchtop to Cabinet	Storage	4x10-4(5x10-4)	CRVpro 4
			0.095(0.13)	2071

Model 2581

Model 2042/2047

Model MPC 601 T

Specifications & Ordering - p. 28, 32, 45

- **Fast drying for vacuum oven samples**
- **Oil-free – no oil changes, no oil mess**
- **Compact, lightweight, portable**

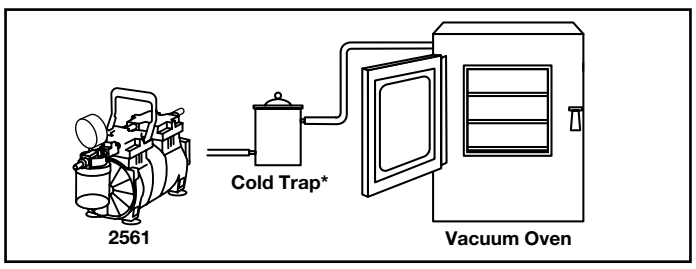
Vacuum ovens are commonly used for drying samples where one wants to dry sample at lowest possible temperature to avoid deterioration of the sample. Beyond sample drying, vacuum ovens are used for applications such as curing epoxies, baking-out, degassing liquids, moisture determination, aging tests, and heat treating. Vacuum pump selection depends on the oven volume, the chemistry of the vapors removed from oven, vacuum level needed for process, and the mass of those vapors removed.

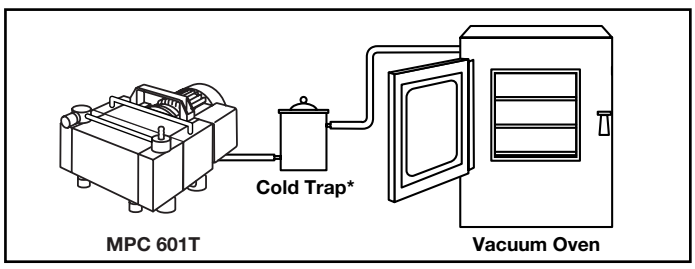
For many procedures using vacuum ovens, an oil-free, standard duty, Wob-l® piston vacuum pump or a chemical duty diaphragm vacuum pump offer a sufficient vacuum level to do the job. These are compact, lightweight, and portable pumps. Because the pumps are oil-free, there is no oil contamination of samples, no exhaust smoke, no oil leaks, and best of all, no oil changes. Normally a liquid trap is located in front of the pump to avoid any vapor that condenses within the vacuum line from being drawn into pump. Supplemental inlet cold traps are recommended for high water vapor loads.

Models 2561, 2581 These standard duty Wob-l piston vacuum pumps pack a lot of performance in a small size for use when removing moisture from samples or the vapor load is 99% water. The pumps include a liquid trap at the inlet, vacuum adjustment and dial vacuum gauge. Both models will reach a vacuum level of 29.8 in. Hg (6.7 mbar/5 torr). Flow on model 2561 is 65 lpm @60Hz and model 2581 is 100lpm@60Hz.

Models 2042, 2047 DRYFAST Two-stage oil-free chemical duty diaphragm vacuum pump are rugged, low maintenance oil-free pump that have two PTFE heads, perfluorelastomer valves, and fluoroplastic wetted surfaces that make it suitable for the aggressive chemical vapors evolved. Model 2042 reaches a ultimate vacuum level of 29.85 in. Hg (1.5 mbar/2 torr) and Model 2047 of 28.5 in Hg (47 mbar/35 torr).

Models MPC 301 Z, 302 Z, 601 T and 901 Z These oilless chemical duty diaphragm vacuum pump are rugged, low maintenance oil-free pump PTFE heads, PEEK valves, and fluoroplastic wetted surfaces for handling aggressive chemical vapors. Two-stage pump models MPC 301 Z and MPC 901 Z can reach ultimate vacuum pressure to 8 mbar (6 torr or 29.7 in. Hg), Model MPC 302 Z can reach 5 mbar (3.8 torr or 29.8 in. Hg), Model MPC 601 T to 2 mbar (1.5 torr or 29.9 in. Hg). Available with optional vacuum regulators and catchpots. See page 69 & 75 for details.





Model
2070/2071 Chemstar Dry

Model
CRVpro 4/6/8

Model
Duoseal 1400/1402/1405

Specifications &
Ordering - p. 48, 52, 54

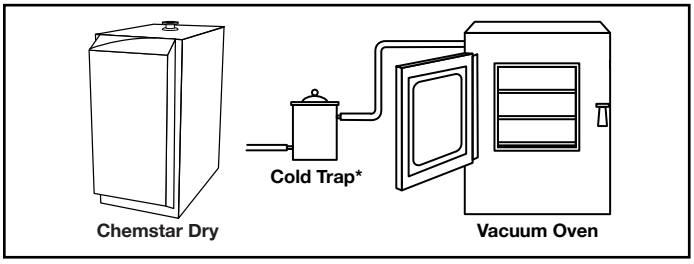
- **High vacuum**
- **High flow**
- **Oil-free option available**

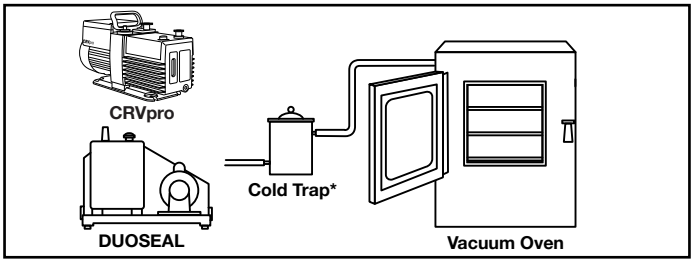
Some applications for vacuum ovens require sample drying, bake-out, curing, etc. require ultimate vacuum pressure below 0.1 torr (0.13 mbar). In these situations, the key factor in vacuum pump selection is the ultimate vacuum level achievable by the pumps. Welch offers solutions for this high vacuum level in oil-free and oil-sealed pumping technologies. Budget requirements play a key role in deciding what type of pumping technology to select.

Models 2070, 2071 Oil-free ChemStar® Dry vacuum system integrates a proprietary vacuum blower backed with a patented PTFE diaphragm pump. Software optimizes proprietary vacuum blower/PTFE diaphragm operation to allow plug and play operation. Vacuum to 0.050 torr (0.07 mbar) depending on model. In-line cold trap is recommended when pumping chemical vapors (see pages 69).

Model CRVpro 4, 6, 8. CRVpro direct-drive rotary vane pumps are built for reliability to provide stable operation and long product lifespan with proper maintenance. The pumps are cool running due to enhanced air flow leading to pump running 10°C cooler than standard direct drive vane pumps. The lower temperature leads to reduced chemical activity within the pump and slows down rates of oil consumption. CRVpro vacuum pumps are available in several sizes to match with your vacuum oven volume. These rugged vacuum pumps can achieve an ultimate vacuum pressure $5x10^{-4}$ mbar ($4x10^{-4}$ torr). In-line cold trap is recommended when pumping chemical vapors (see pages 69).

Models 1400, 1405, 1402 DuoSeal® belt-drive vacuum pumps are well-known for their durability and ruggedness. The large oil capacity of the DuoSeal pump effectively dilutes contaminants for longer maintenance intervals and pump life. Chemical reactions affecting the pump oil are lessened by low pump operating temperature, a result of slow pump rotation, reduced friction, and large oil capacity. In-line cold trap is recommended when pumping chemical vapors (see pages 69).





Model Selector | Vacuum Ovens

	Oil-Free Vacuum 1.5 to 3.5 torr		Oil-Seal Deep Vacuum 2x10-3 torr	
Oven Volume ft^3	Aqueous Vapours	Chemical Vapours	Single stage direct drive	Two stage direct drive
0.6 - 1.5	2561B-50	DryFast 2042	CRVpro 4	1400
2.5 - 4.5	2561B-50	DryFast 2047	CRVpro 6	1402
4.5 - 9.0	2581B-50	DryFast 2054	CRVpro 8	1402

FOR EVACUATION OF REFRIGERATION AND HVAC SYSTEMS





Model 1402B-46	Model 1376B-46	Model 1397B-46	Model CRVpro 8	Model CRVpro 16	Specifications & Ordering - p. 52, 55, 56

- All common commercial refrigerants
- Lithium Bromide / Ammonia Chillers

Welch vacuum pumps are known worldwide for ruggedness and dependability. High capacity, two stage rotary vacuum pumps get you on and off the job fast.

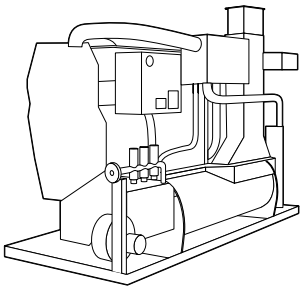
- Deep vacuum for fast evacuation and dehydration
- Precision machined from the most durable materials
- Gas ballast for high vapor loads

Select from DuoSeal® and ChemStar® belt-drive vacuum pump models for top performance & minimum maintenance or CRVpro models for portable vacuum. 3-Phase models also available for DuoSeal pumps. See opposite page for pump selection by refrigeration application or consult your Welch representative at www.welchvacuum.com.

Specifications					
Model	**1402**	**1376**	**1397**	**CRVpro 8**	**CRVpro 16**
Free Air Displacement					
cfm (l/min.)@60 Hz	5.6(160)	10.6(300)	17.7(500)	5.6(160)	12.8(363)
m3/hr (l/min.)@50 Hz	9.5(160)	18(300)	30(500)	8(133)	18.3(305)
Ultimate Pressure, torr(mbar)	1×10^{-4} (1.3×10^{-4})	1×10^{-4} (1.3×10^{-4})	1×10^{-4} (1.3×10^{-4})	4×10^{-4} (5×10^{-4})	2×10^{-4} (3×10^{-4})
Gas Ballast	Yes	Yes	Yes	Yes	Yes
Pump RPM	525	525	400	1725@60 Hz	1725@60 Hz
Motor Horsepower (watts)	1/2 (370)	1 (750)	1 (750)	1/2 (400)	1 (850)
Oil Capacity, qt.(liters)	2.25 (2.1)	2.5 (2.37)	1.25 (1.2)	1.06 (1)	2.54 (2.4)
Tubing Needed, I.D. in. (mm)	13/16 (21)	13/16 (21)	1-5/8 (41)	13/16 (21)	13/16 (21)
Inlet and Exhaust Connection	1-20[1]	1-20[1]	1 3/4-20[2]	NW16[1]	NW25[1]
Overall Dimensions LxWxH in.(cm)	19.3x14.1x15.4 (49x35x39)	19.3x12.3x15.6 (49x31x40)	26x13.7x18.8 (66x35x48)	18.2x6.1x9.1 (46x16x23)	22.4x8.1x11.4 (57x21x29)
Weight, lbs.(kg)	112(51)	156(71)	205(93)	49.6 (22.5)	81.6 (37)
Ship Weight, lbs.(kg)	133(60.5)	181(82.3)	213(96.8)	61.8 (28.1)	94.8 (43.1)
Shipping Carton Dimensions LxWxH in.(cm)	22.5x15.5x19.5 (57x39x50)	22x18x19 (60x45x48)	27.3x18x22 (69x46x56)	22.8x13x12.8 (58x33x33)	24x15.8x14 (68x38x39)
Ordering Information					
Wired for 115V, 60Hz, 1 Ph w/N. American 115V Plug	1402B-46	1376B-46	1397B-46	3081-02	3161-02
Wired for 220V, 50Hz, 1 Ph w/ Cont. Euro. (Schuko) Plug	1402C-46	1376C-46	1397C-46	____	____

Notes: 1. Includes 3/4 in. flare fitting 2. Includes female 1-1/2" NPT

LITHIUM BROMIDE ABSORPTION CHILLER



Pump Requirements

- Handles harsh salt-laden water vapor
- Withstands accidental ingestion of salt solution
- Recirculates clean fraction of vacuum oil

Tonnage	Welch Model
100–500	1402B–46
500–1000	1402B–46,1376B–46
1000–1500	1376B–46, 1397B–46

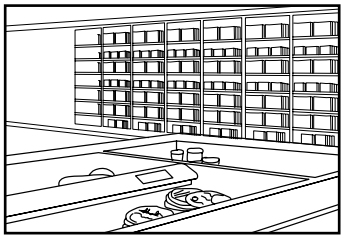
ROOFTOP/RTU'S

Pump Requirements

- Portable and powerful
- Draws a very deep vacuum

Tonnage	Welch Model
1–50	3081-02
50–100	3161-02

COLD STORAGE

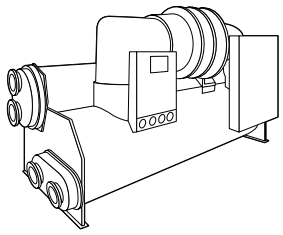


Pump Requirements

- Handles long pumpdown time effectively
- Handles high water vapor loads
- Draws a very deep vacuum

Tonnage	Welch Model
10–50	1402B–46
50–500	1402B–46, 1376B–46
500–1000	1397B–46

HCFC, CFC OR AMMONIA CHILLERS



Pump Requirements

- Seals and gaskets won't break down in the presence of R–11, R–12, R–13, R–22, R–113, R–123, R–114, R–502, R–503 or ammonia
- Draws a very deep vacuum
- Order ChemStar pump for highly corrosive systems

Tonnage	DuoSeal	ChemStar
10–50	1402B–46	1402N-01
50–500	1402B–46, 1376B–46	1376N-01
500–1000	1397B–46	1376N-01

The ABC's of Vacuum Pump Selection				
	A	+	B	= C
	Coil Size		Desired Vacuum	Flow Needed
Units	Ton		micron Hg(mbar)	L/min
Residential AC	1.5		50(0.07)	160 to 450
Residential AC	3		50(0.07)	250 to 340
Commercial Air Handling	5-10		500(0.7)	225 to 340
Appliance	0.5		300(0.4)	165 to 310
Leak Testing	1.5		500(0.7)	30 to 170

WELCH CRVpro VACUUM PUMPS

Model 3081-01

Specifications & Ordering - p. 53

- **Lightweight, compact pump**
- **Ultimate 0.0004 torr (0.0005 mbar)**
- **Integral isolation valve**

Welch direct drive vacuum pumps are high performance, but very portable with a small footprint in your lab. Ultimate vacuum to 1 x 10^{-4} torr, flow .3 cfm for rapid box chamber cycling.

This oil-seal pump design has an integrated isolation device to prevent oil and air contaminating your system in the event of a power failure. Pump can be ordered with an optional exhaust filter (see p. 70) to control exhaust oil mist.

HIGH VACUUM FOR STAINLESS STEEL / GLASS GLOVE BOXES

Model 1402

Specifications & Ordering - p. 54

- **High vacuum to 0.0001 torr**
- **High flow (5.6 cfm)**
- **Very rugged and reliable**

DuoSeal® vacuum pumps are effective for use with high purity atmosphere metal glove boxes. Use DuoSeal pumps to draw a deep vacuum when establishing glove box atmosphere and for rapid transfer chamber cycling.

The large oil capacity of the DuoSeal pump effectively dilutes contaminants for longer maintenance intervals levels and pump life. Chemical reactions affecting the pump oil are lessened by low pump operating temperature, a result of slow pump rotation and reduced friction. Use of a cold trap to minimize harmful vapor ingress is recommended.

NOTE: Optional exhaust filter catalog number 1417A is recommended for glove box applications to control exhaust oil mist (see p. 70).

OIL-FREE EVACUATION OF GLOVE BOX AND TRANSFER STATION

- **High flow to shorten the purge/fill cycle**
- **Oil-free - no contamination, no oil changes**
- **Compact, lightweight, portable**

WOB-L® dry piston pumps are effective for acrylic and polycarbonate glove boxes with vacuum requirements above 5 torr (6.7 mbar). The oil-free WOB-L piston vacuum pump provides continuous, reliable, high flow vacuum for your glove box. Model 2581 is suited for transfer chamber evacuation and purge/fill cycles for a glove box of up to 30 ft^3 (0.84 m^3). The pump is complete with vacuum adjustment, vacuum gauge to monitor vacuum level, and muffler. See application note below regarding glove box vacuum limitations.

Model 2581

Specifications & Ordering - p. 46

Application Note | Glove Box

Standard glove boxes and transfer chambers are not normally evacuated much below 25 torr (29" Hg) due to plastic material limitations. Both acrylic and polycarbonate which are used in standard glove boxes are not suited for deep vacuum (1 torr operation).

High end glove boxes capable of deeper vacuum normally are constructed of stainless steel and heavy glass plates. Follow glove box manufacturer recommendations for vacuum pumping requirements.

Model Selector | Glove Box

Oil-Free Vacuum for Acrylic Glove Boxes	Oil-Seal Deep Vacuum for Metal Glove Boxes	
Aqueous Vapors	Portable Direct Drive	Durable Belt-Drive
2581B-50	CRVpro 8 CRVpro 16	1402B-01 1376B-01




See specific Cat no. for specific listing.

Model 2025	Model 2026	Model 2027	Model 2028

Specifications

Model	w/Analog Gauge **2025**	w/Analog Gauge **2026**	w/Digital Gauge **2027**	Programmable w/Digital Gauge **2028**
Free Air Displacement				
cfm(l/min.) @60Hz	1.2 (35)	1.2 (35)	1.2 (35)	1.2 (35)
m^3/hr(l/min.) @50Hz	1.7 (29)	1.7 (29)	1.7 (29)	1.7 (29)
Ult. Vac. Pressure, torr (mbar)	9 (12)	2 (2.7)	2 (2.7)	2 (2.7)
Maximum Vacuum, in. Hg	29.6	29.85	29.85	29.85
Tubing Needed, I.D. in. (mm)	1/4 (7)	1/4 (7)	1/4 (7)	1/4 (7)
Motor Horsepower (watts)	1/5 (150)	1/5 (150)	1/5 (150)	1/5 (150)
Adjustable Vac./Gas Ballast	Yes	Yes	Yes	Yes
Intake(Exhaust) Thread NPT	3/8	3/8	3/8	3/8
Weight lbs.(kg)	30 (13.6)	30 (13.6)	30 (13.6)	30 (13.6)
Overall Dimensions LxWxH in.(cm)	13.6x12x11.3 (35x31x29)	13.6x12x11.3 (35x31x29)	13.6x12x11.3 (35x31x29)	13.6x12x11.3 (35x31x29)
Ship Weight, lbs.(kg)	36 (16.4)	36 (16.4)	36 (16.4)	36 (16.4)
Shipping Carton Dimensions LxWxH in.(cm)	18x17x17 (46x42x43)	18x17x17 (46x42x43)	18x17x17 (46x42x43)	18x17x17 (46x42x43)

Ordering Information

Wired for 115V, 60Hz,1 Ph with N. Amer. 115V Plug	202501 CSA	202601 CSA	202701 CSA	202801 CSA
Wired for 230V, 50/60Hz, 1Ph, w/UK and Schuko cord sets included	202503 CE	---	202703 CE	202803 CE
Wired for 100V, 50/60Hz for Japan	202505	---	202705	202805

Self-Cleaning Dry Vacuum Systems
These chemical duty dry diaphragm pumping systems are typically used in evaporation applications, e.g. rotavaps. Self-cleaning air purge cycle at the conclusion of each run maintains consistent performance and extends service intervals. Dial up vacuum control and a handy switch for instant reaction to bumping / foaming conditions. Rugged PTFE construction of all contact surfaces.

See pages 6-9 for further details on using systems on Rotary Evaporators

GREEN By Design

CAPTURE™ vapor emissions from rotary evaporators with an integrated solvent recovery system - see p. 71

For a Complete System

Component	page
• Traps	69
• CAPTURE Recovery System	71
• Hose	67
• Gauges	76
• Service Kits	80

Diaphragm Vacuum Pumps | DryFast® Chemical Duty Pumps

See specific Cat no. for specific listing.

	Model 2019	Model 2014 DryFast	Models 2034 / 2044 / 2037 / 2047 DryFast

Specifications	Coated Head	Ultimate Vacuum Pressure 9 torr to 40 torr				
Model	**2019**	**2014**	**2034**	**2044**	**2037**	**2047**
Free Air Displacement						
cfm(l/min.) @60Hz	1.3 (37)	1.2 (35)	0.9 (25)	1.2 (35)	1.8 (50)	2.5 (70)
m^3/hr(l/min.) @50Hz	1.9 (31)	1.75 (29)	1.25 (21)	1.75 (29)	2.5 (42)	3.5 (58)
Ult. Vac. Pressure, torr(mbar)	150 (200)	40 (53)	9 (12)	9 (12)	35 (47)	35 (47)
Maximum Vacuum, in. Hg	24	28.3	29.6	29.6	28.5	28.5
Motor Horsepower - HP(watts)	1/15	1/5 (150)	1/5 (150)	1/5 (150)	1/5 (150)	1/5 (150)
Adjustable Vac./Gas Ballast	No	Yes	Yes	Yes	Yes	Yes
Tubing Needed, I.D. in.(mm)	1/4 (7)	1/4 (7)	1/4 (7)	1/4 (7)	1/4 (7)	1/4 (7)
Intake(Exhaust) Thread NPT	1/4 NPT	M14 (1/8)	M14 (1/8)	M14 (1/8)	M14 (1/8)	M14 (1/8)
Weight lbs.(kg)	10.2 (4.6)	15.0 (6.8)	21.25 (9.6)	21.25 (9.6)	21.25 (9.6)	21.25 (9.6)
Overall Dimensions LxWxH in.(cm)	8.8x5.0x8.8 (22x13x22)	12x7.0x8.3 (31x 18x2)	13.8x6.8x8.8 (35x17x22)	13.8x6.8x8.8 (35x17x22)	13.8x6.8x8.8 (35x17x22)	13.8x6.8x8.8 (35x17x22)
Ship Weight, lbs.(kg)	10.2 (4.6)	19 (8.6)	25 (11.3)	25 (11.3)	25 (11.3)	25 (11.3)
Shipping Carton Dimensions LxWxH in.(cm)	16x12x12.8 (41x30x33)	21x14x15 (52x35x37)	21x14x15 (52x35x37)	21x14x15 (52x35x37)	21x14x15 (52x35x37)	21x14x15 (52x35x37)
Ordering Information						
Wired for 115V, 60Hz,1 Ph with N. Amer. 115V Plug	2019B-01 UL	2014B-01 CSA	2034B-01 CSA	2044B-01 CSA	2037B-01 CSA	2047B-01 CSA
Wired for 230V, 50/60Hz, 1Ph, w/UK and Schuko cord sets included [1]	2019C-02 CE	2014C-02 CE	2034C-02 CE	2044C-02 CE	2037C-02 CE	2047C-02 CE
Wired for 100V, 50/60Hz for Japan	----	2014C-05	2034C-05	2044C-05	---	---

Notes: 1. 230V in US also requires Cord 61-8707 2. For 8 mm Hose Barb, Order 710798

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DryFast Diaphragm Vacuum Pumps

- Chemical Resistant
- Oil Free

Tuneable Vacuum

Model 2019 PTFE coated head for filtration of moderate solvents

DryFast models 2014, 2034, 2044, 2037, 2047 & DryFast Ultra models 2032, 2042. All major parts in contact with vapor are constructed of corrosion resistant PTFE and perflouro plastic materials. Models comes standard with tuneable vacuum control.

Model 2163 Coated heads for moderate solvent vapors

Models 2052, 2054, 2062, 2064 & 2067 Wetted parts are made of PTFE and other fluorinated plastics. High flow models are commonly used for scale-up operations.

Models 2032 / 2042 DryFast Ultra

Models 2052 / 2054

Models 2163 / 2062 / 2064 / 2067

Coated Heads	Flow Rate > 100 L/min			Ultimate Vacuum Pressure ≤ 2 torr			
2163	**2054**	**2064**	**2067**	**2032**	**2042**	**2052**	**2062**
6.1 (173)	3.4 (100)	6.1 (173)	7.8 (221)	0.9 (25)	1.2 (35)	2.3 (65)	4.2 (119)
----	----	----	----	1.25 (21)	1.75 (29)	----	----
6 (8)	6 (8)	6 (8)	56 (75)	2 (2.7)	2 (2.7)	1.5 (2)	1.5 (2)
29.7	29.7	29.7	27.72	29.85	29.85	29.9	29.9
0.5/0.6 (370/440)	1/2 (370)	0.5/0.6 (370/440)	0.5/0.6 (370/440)	1/5 (150)	1/5 (150)	0.53 (390)	0.53 (370)
No	No	No	No	Yes	Yes	No	No
hose connector available	1/4 (8)	hose connector available	hose connector available	1/4 (7)	1/4 (7)	1/4 (8)	1/4 (8)
NW 16 - 1/4" NPT[2]	NW 16 - 1/4" NPT[2]	NW 16 - 1/4" NPT[2]	NW 16 - 1/4" NPT[2]	M14(1/8)	M14(1/8)	NW 16 - 1/4" NPT	NW 16 - 1/4" NPT
72.3 (32.8)	40.3 (18.3)	72.3 (32.8)	72.3 (32.8)	21.25 (9.6)	21.25 (9.6)	40.3 (18.3)	72.3 (32.8)
21x11x12 (53x28x31)	9x15x7 (23x38x18)	21x11x12 (53x28x31)	21x11x12 (53x28x31)	13.8x6.8x8.8 (35x17x22)	13.8x6.8x8.8 (35.2x17x22)	9x15x7 (23x38x18)	21x11x12 (53x28x31)
88.2 (40.1)	48.5 (22)	88.2 (40.1)	88.2 (40.1)	25 (11.3)	25 (11.3)	49.8 (22.6)	40.3 (18.3)
23.6x15.8x16.1 (60x40x41)	18.9x12.6x11.8 (48x32x30)	23.6x15.8x16.1 (60x40x41)	23.6x15.8x16.1 (60x40x41)	21x14x15 (52x35x37)	21x14x15 (52x35x37)	10.2x16.6x7.5 (26x42x19)	9.1x15x6.7 (23x38x16.9)
2163B-01 CE	2054B-01 CE	2064B-01 CE	2067B-01 CE	2032B-01 CSA	2042B-01 CSA	2052B-01 CE	2062B-01 CE
2163C-02 CE	2054C-02 CE	2064C-02 CE	2067C-02 CE	2032C-02 CE	2042C-02 CE	2052C-02 CE	2062C-02 CE
-----	----	-----	----	2032C-05	2042C-05	----	----

Inlet/Exhaust Separator Jars
230 ml glass jar assembly attaches to pump intake or exhaust to capture ingested liquids.
See page 79 for replacement Jars.

1423B

Pump Model	CAT. No.
All DryFast models	1423B

Digital Vacuum Regulator
- Rack mountable
- Variable vacuum control

The Digital Vacuum Regulator works with Welch DryFast™ pumps or any brand dry pump with flow up to 35 l/min torr vacuum ranging from 1 torr(1.3 mbar) to atmosphere.
See p. 76 for more information.

Pump Model	CAT. No.
2014, 2034, 2032, 2044, 2042	1640A-01

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Model
MPC 090 E

Models
MPC 095 Z / MPC 110 E
MPC 105 T

Model
MPC 101 Z

CE **All product listings on this page CE listed.**

Specifications

Model	MPC 090 E	MPC 095 Z	MPC 110 E	MPC 101 Z	MPC 105 T
Number of heads / stages	**2 / 1**	**2 / 2**	**2 / 1**	**2 / 2**	**4 / 3**
Free Air Displacement					
m3/h(L/min)@50Hz	1(15)	0.5(8)	0.9(15)	1.0(16.7)	1.2(20)
cfm(L/min)@60Hz	0.5(15)	0.3(9.1)	0.6(16.6)	0.6(18)	0.7(20)
Ultimate pressure, mbar(torr)	100(75)	5(3.8)	60(45)	8(6)	2(1.5)
Maximum Vacuum, in. Hg	27	29.8	28.2	29.7	29.9
Max. overpressure, bar	----	----	----	----	----
IN / EX hose connector	DN 6 / silencer	DN 8	DN 8	DN 8	DN 8
Tubing Needed, I.D. mm(in.)	6(0.24)	8(0.32)	8(0.32)	8(0.32)	8(0.32)
Intake(Exhaust) Thread NPT	-(-)	-(1/8)	1/8(1/8)	1/4(1/4)	-(-)
Sound level, dB(A)	<45	44	44	45	44
Motor Power, watts(HP)	20(0.03)	68(0.09)	68(0.09)	60(0.08)	68(0.09)
Type of motor protection, IP	20	42	42	54	42
Weight, lbs.(kg)	5.1(2.3)	13.8(6.3)	13.8(6.3)	14.3(6.5)	16.5(7.5)
Overall Dimensions	4.5x6.5x 5.7	9.3x5.5x 10.9	9.3x5.5x 10.9	7.7x9.3x 5.7	9.3x5.5x12.9
LxWxH in.(cm)	(12x 17x 15)	(24x14x 28)	(24x14x 28)	(20x 24x 15)	(24x14x33)
Ship Weight, lbs.(kg)	6.6(3)	17.6(8)	17.6(8)	19.8(9)	22.1(10)
Shipping Carton Dimensions LxWxHin. (cm)	15.7x11.8x6.7 (40x30x17)	11.8x11.8x15.7 (30x30x40)	11.8x11.8x15.7 (30x30x40)	16.1x10.2x9.8 (41x26x25)	11.8x11.8x15.7 (30x30x40)
Ordering Information					
230V, 50/60Hz, 1 Ph [1]	----	----	----	412522	----
115V, 50/60Hz, 1 Ph [2]	----	----	----	412522-01	----
115/230V, 50/60Hz , 1 Ph [3]	----	----	----	----	----
90-260V, 50/60Hz [4]	412021	412422-02	412421-02	----	412443-02
230/400V, 50Hz , 3 Ph [6]	----	----	----	----	----

Applications

MPC Diaphragm Vacuum Pumps

- Chemical Resistant
- Oil Free

Gas Ballast

MPC models use PTFE and other flourinated plastics for the wetted parts to allow agressive acids and vapors to be pumped. All two-stage and three-stage MPC pumps come standard wtih gas a ballast valve.

Model MPC 302 Z uses a patented pump head design to significantly improve performance. Optimized construction of the pump heads allows the MPC 302 Z to achieve a 17% higher pumping speed in the application critical vacuum range compared to similar products. Besides the pumping speed the ultimate vacuum pressure is improved as well to 5 mbar(3.8 torr).

Model
MPC 201 T

Model
MPC 301 E

Models
MPC 301 Z / MPC 302 Z
MPC 601 E

Models
MPC 301 Z ef

	MPC 201 T	MPC 301 E	MPC 301 Z	MPC 302 Z	MPC 301 Z ef Ecoflex	MPC 601 E
	4 / 3	1 / 1	2 / 2	2 / 2	2 / 2	2 / 1
	2.0(33)	2.3(38)	2.3(38)	2.6(43)	2.6(43)	3.8(63)
	1.3(36)	1.5(41)	1.5(41)	1.8(52)	1.6(43)	2.5(70)
	2(1.5)	75(56.3)	8(6)	<5(3.8)	8(6)	75(56.3)
	29.9	27.7	29.7	29.8	29.7	27.7
	----	----	----	----	----	----
	DN 8	DN 8	DN 8	DN 8	DN 8	DN 8
	8(0.32)	8(0.32)	8(0.32)	8(0.32)	8(0.32)	8(0.32)
	1/4(1/4)	-(-)	-(-)	-(-)	-(-)	-(1/4)
	45	45	45	45	44	45
	90(0.12)	180(0.25)	180(0.25)	180(0.25)	200(0.27)	180(0.25)
	54	54	54	54	54	54
	22.7(10.3)	19.6(8.9)	24.7(11.2)	24.7(11.2)	34.2(15.5)	24.7(11.2)
	7.9x 10.2x5.9 (20x26x15)	10.2x6.4x9.9 (26x16x25)	9.1x10.4x6.7 (23x27x17)	9.1x10.4x6.7 (23x27x17)	10.2x12.2x7.5 (26x31x19)	9.1x10.4x6.7 (23x27x17)
	28.7(13)	26.5(12)	30.9(14)	30.9(14)	39.7(18)	30.9(14)
	16x10x10 (41x26x25)	14x10x12 (35x25x30)	19x13x12 (48x32x30)	19x13x12 (48x32x30)	19x13x12 (48x32x30)	19x13x12 (48x32x30)
	412543	412711	412722	414722	412922	412721
	412543-01	412711-01	412722-01	414722-01	412922-01	412721-01
	----	----	----	----	----	----
	----	----	----	----	----	----
	----	o.r. [8]	412722-02[7]	414722-02[7]	----	412721-02[7]

1. With Schuko and UK plug leads
2. With US plug lead
3. With Schuko, UK and US plug leads
4. With AC/DC adapter, Schuko, UK and US plug leads
5. With JP plug lead
6. Requires hard wiring to switched supply
7. With 3 phase 16A CEE plug lead

Note: Pumps can be adapted for OEM equipment integration or for all-in-one packages.

Vacuum Regulator with Dial Gauge
The regulator valve for intake allows the adjustment of the ultimate pressure. The dial vacuum gauge indicates the vacuum level. The air regulator valve will be mounted directly on the pump. See page 75.

For Pump Model	CAT. No.
MPC 095 Z, MPC 110 E, MPC 105 T	700459
MPC 101 Z, MPC 201 T, MPC 301 E, MPC 301 Z, MPC 601 E	700458

700459

700458

For a Complete System

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Models
MPC 601 T / MPC 901 Z
MPC 1201 E

Model
MPC 601 T ef

Models
MPC 1201 T / MPC 1801 Z
MPC 2401 E

CE

Specifications

Model	MPC 601 T	MPC 601 T ef	MPC 901 Z	MPC 1201 E	MPC 1201 T
Number of heads / stages	**4 / 3**	**4 / 3**	**4 / 2**	**4 / 1**	**8 / 3**
Free Air Displacement					
m3/h(L/min)@50Hz	4.5(75)	4.9(81)	6.8(113)	8.3(138)	8.3(135)
cfm(L/min)@60Hz	2.9(81)	2.9(81)	4.4(125)	5.3(151)	5.3(151)
Ultimate pressure, mbar(torr)	2(1.5)	2(1.5)	8(6)	75(56.3)	2(1.5)
Maximum Vacuum, in. Hg	29.9	29.9	29.7	27.7	29.9
Max. overpressure, bar	---	---	---	---	---
IN / EX hose connector	DN 8	DN 8	DN 8	DN 8	DN 16 KF
Tubing Needed, I.D. mm(in.)	8(0.32)	8(0.32)	8(0.32)	8(0.32)	hose connector available
Intake(Exhaust) Thread NPT	- (1/4)	- (1/4)	- (-)	- (1/4)	1/4(1/4)
Sound level, dB(A)	45	44	45	45	48
Motor Power, watts(HP)	370(0.5)	390(0.53)	370(0.5)	370(0.5)	370/440(0.5/0.6)
Type of motor protection, IP	54	54	54	54	54
Weight, kg(lbs.)	18.3(40.3)	22.6(49.8)	18.3(40.3)	18.3(40.3)	32.8(72.3)
Overall Dimensions	9.1x15x6.7	10.2x16.5x7.5	9.1x15x6.7	9.1x15x6.7	21.3x11.8x9.4
LxWxH in.(cm)	(23x38x17)	(26x42x 19)	(23x38x17)	(23x38x17)	(54x30x24)
Ship Weight, lbs.(kg)	48.5(22)	63.9(29)	48.5(22)	48.5(22)	88.2(40.1)
Shipping Carton Dimensions LxWxH in.(cm)	18.9x12.6x11.8 (48x32x30)	23.6x15.8x22.1 (60x40x56)	18.9x12.6x11.8 (48x32x30)	18.9x12.6x11.8 (48x32x30)	23.6x15.8x16.1 (60x40x41)
Ordering Information					
230V, 50/60Hz, 1 Ph [1]	412743	412943	412742	412741	412783
115V, 50/60Hz, 1 Ph [2]	412743-01	412943-01	412742-01	412741-01	412783-01
230/400V, 50Hz, 3 Ph [6]	412743-02	---	412742-02	412741-02	412783-02

Applications

MPC Diaphragm Vacuum Pumps

- Chemical Resistant
- Oil Free

Gas Ballast

MPC models use PTFE and other flourinated plastics for the wetted parts to allow agressive acids and vapors to be pumped. All two-stage and three-stage MPC pumps come standard wtih gas a ballast valve.

Model MPC 302 Z uses a patented pump head design to significantly improve performance. Optimized construction of the pump heads allows the MPC 302 Z to achieve a 17% higher pumping speed in the application critical vacuum range compared to similar products. Besides the pumping speed the ultimate vacuum pressure is improved as well to 5 mbar(3.8 torr).

Model
MPC 1201 T ef

Model
MPC 301 Zp Ex

Model
MPC 601 Tp Ex

	MPC 1201 T ef	MPC 1801 Z	MPC 2401 E	MPC 301 Zp Ex ATEX	MPC 601 Tp Ex ATEX
	8 / 3	8 / 2	8 / 1	2 / 2	4 / 3
	8.3(138)	12(201)	15.5(258)	2.3(38)	4.5(75)
	4.8(138)	7.8(222)	10(283)	1.3(38)	2.7(75)
	2(1.5)	8(6)	75(56.3)	8(6)	2(1.5)
	29.9	29.7	27.7	29.7	29.9
	---	---	---	---	---
	DN 16 KF	DN 16 KF	DN 16 KF	DN 8	DN 16 KF
	hose connector available	hose connector available	hose connector available	8(0.32)	hose connector available
	1/4(1/4)	1/4(1/4)	1/4(1/4)	---	---
	47	48	48	45	45
	370(0.5)	370/440(0.5/0.6)	370/440(0.5/0.6)	180(0.25)	370(0.5)
	54	54	54	55	55
	34(75)	32.8(72.3)	32.8(72.3)	22.9(50.5)	29.7(65.5)
	21.3x11.8x12.6	21.3x11.8x9.4	21.3x11.8x9.4	9.4x11.8x10.2	9.4x16.7x10.7
	(54x30x32)	(54x30x24)	(54x30x24)	(24x30x36)	(24x43x27)
	91.3(41.5)	88.2(40.1)	88.2(40.1)	57.3(26)	72.8(33)
	60x40x41 (24x16x16)	60x40x41 (24x16x16)	60x40x41 (24x16x16)	48x32x30 (19x13x12)	61x41x58 (24x16x23)
	412983	412782	412781	---	---
	412983-01	412782-01	412781-01	---	---
	---	412782-02	412781-02	4000481-04	4000511-04

1. With Schuko and UK plug leads
2. With US plug lead
3. With Schuko, UK and US plug leads
4. With AC/DC adapter, Schuko, UK and US plug leads
5. With JP plug lead
6. Requires hard wiring to switched supply
7. With 3 phase 16A CEE plug lead
8. These pumps can be delivered on request

Note: Pumps can be adapted for OEM equipment integration or for all-in-one packages.

Handheld General Range Vacuum Gauge - PIZA 101
Piezo resistive robust rough vacuum gauge with digital display. Alternative for mechanical vacuum gauges.

Features

- With Piezo resistive ceramic sensor
- Economical rough vacuum gauge for multiple uses in laboratories
- Portable unit connects quickly to any vacuum source
- 90-260V, 50/60Hz [4]

Type	Range mbar(torr)	CAT. No.
PIZA 101	1050 to 1(785 to 1)	600071

For more detailed information and other models, see p. 77.

For a Complete System

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Diaphragm Vacuum Pumps | MP Standard Duty

Model
MP 060 E

Model
MP 055 Z / MP 105 E

Model
MP 101 Z

CE

Specifications				
Ilmvac Model	**MP 060 E**	**MP 055 Z**	**MP 105 E**	**MP 101 Z**
Number of heads / stages	**2 / 1**	**2 / 2**	**2 / 1**	**2 / 2**
Free Air Displacement				
m3/h(L/min)@50Hz	0.7(11.7)	0.5(8)	0.9(15)	1.0(16.7)
cfm(L/min)@60Hz	0.5(14)	0.3(9.1)	0.6(16.6)	0.7(18)
Ultimate pressure, mbar(torr)	100(75)	5(3.8)	60(45)	8(6)
Maximum Vacuum, in. Hg	27	29.8	28.2	29.7
Max. overpressure, bar	----	----	----	----
IN / EX hose connector	DN 6 silencer	DN 8	DN 8	DN 8
Tubing Needed, I.D. mm(in.)	6(0.24)	8(0.32)	8(0.32)	8(0.32)
Intake(EXhaust) Thread NPT	- (-)	- (1/8)	1/8(1/8)	1/4(1/4)
Sound level, dB(A)	42	44	44	45
Motor Power, watts(HP)	20(0.03)	68(0.09)	68(0.09)	60(0.08)
Type of motor protection, IP	20	42	42	54
Weight, kg(lbs.)	2.3(5.1)	6.25(13.8)	6.25(13.8)	6.5(14.3)
Overall Dimensions L x W xH in.(cm)	5.7x5x5.4 (14.4x12.7x13.6)	9x6x11 (23.5x14x27.7)	9x6x11 (23.5x14x27.7)	8x9x6 (20x24x15)
Ship Weight, lbs.(kg)	11(5)	8(17.6)	8(17.6)	9(19.8)
Shipping Carton Dimensions LxWxH cm(in.)	16x12x7 (40x30x17)	12x12x16 (30x30x40)	12x12x16 (30x30x40)	16x10x10 (41x26x25)
Ordering Information				
230V, 50/60Hz, 1 Ph [1]	----	----	----	411522
115V, 50/60Hz, 1 Ph [2]	----	----	----	411522-01
115/230V, 50/60Hz, 1 Ph[3]	----	411422	411421	----
90-260V, 50/60Hz [4]	411011	----	----	----
230/400V, 50/60Hz, 3 Ph[6]	----	----	----	----

Applications

MP Diaphragm Vacuum Pumps

- Standard Duty
- Oil Free

Exhaust Silencer

MP models use aluminium pump heads suitable for pumping non-reactive gases/vapors such as air, noble gases and water vapor. PTFE diaphragms are used because they offer longer lifetime than conventional elastomer diaphragms. The diaphragms consist of a PTFE membrane sandwiched to a strong non-wetted backing.

PEEK valves are used due to their excellent resistance to chemical attack and are extremely hard wearing when compared to elastomer valves. Connectors are made from PA with PTFE tubing.

Exhaust silencers are included with MP pumps.

Model
MP 101 V / MP 201 T

Model
MP 301 E

Model
MP 301 Z / MP 601 E

Model
MP 301 V

MP 101 V 4 / 4	MP 201 T 4 / 3	MP 301 E 1 / 1	MP 301 Z 2 / 2	MP 301 V 4 / 4	MP 601 E 2 / 1
1.0(16.7)	2.0(33)	2.3(38)	2.3(38)	2.3(38)	3.8(63)
0.7(18)	1.3(36)	1.5(41)	1.5(41)	1.5(41)	2.5(70)
1(0.75)	2(1.5)	75(56.3)	8(6)	1(0.75)	75(56.3)
29.9	29.9	27.7	29.7	29.9	27.7
----	----	----	----	----	----
DN 8	DN 8	DN 8	DN 8	DN 16 KF / DN 8	DN 8
8(0.32)	8(0.32)	8(0.32)	8(0.32)	hose connector available	8(0.32)
1/4(1/4)	1/4(1/4)	- (-)	- (-)	- (-)	- (1/4)
45	45	45	45	45	45
90(0.12)	90(0.12)	180(0.25)	180(0.25)	370(0.5)	180(0.25)
54	54	54	54	54	54
10.3(22.7)	10.3(22.7)	8.9(19.6)	11.2(24.7)	18.3(40.3)	11.2(24.7)
8x10x6 (20x26x15)	8x10x6 (20x26x15)	10x6x10 (26x16x25)	9x10x7 (23x27x17)	9x15x7 (23x38x17)	9x10x7 (23x27x17)
13(28.7)	13(28.7)	12(26.5)	14(30.9)	22(48.5)	14(30.9)
16x10x10 (41x26x25)	16x10x10 (41x26x25)	14x10x12 (35x25x30)	19x13x12 (48x32x30)	19x13x12 (48x32x30)	19x13x12 (48x32x30)
411544	411543	411711	411722	411744	411721
411544-01	411543-01	411711-01	411722-01	411744-01	411721-01
----	----	----	----	----	----
----	----	----	----	----	----
----	----	o.r. 8	411722-02	411744-02	411721-02

1. With Schuko and UK plug leads
2. With US plug lead
3. With Schuko, UK and US plug leads
4. With AC/DC adapter, Schuko, UK and US plug leads
5. With JP plug lead
6. Requires hard wiring to switched supply
7. With 3 phase 16A CEE plug lead
8. These pumps can be delivered on request

Note: Pumps can be adapted for OEM equipment integration or for all-in-one packages.

Hose Connectors

Type	CAT. No.
DN 8 male 1/8 inch	710953
DN 10 male 1/4 inch	710955
Y - piece	829923

See page 68.

KF Connectors

Connectors for vacuum hose & DN KF.

Type	CAT. No.
DN 16 KF - 1/4 AL	710108
DN 25 KF - 1/4 AL	710700

For a Complete System

Model MPR 030 Z

Model MPC 155 Z

Model MPC 155 Z

Model MPC 105 T

Model 8115/8157

Specifications

	MPR 030Z	MPR 060E	MPC 110 E	MPC 155 Z	MPC 105 T	8115[1]	8157[1]
Free air displacement							
lpm@1700 rpm	6	10	17	23	17	43	70
Ult. Vac Pressure, mbar(torr)	5(3.8)	60(45)	60(45)	5(3.8)	2(1.5)	2(2.7)	35(47)
Number of heads	2	2	2	4	4	2	2
Number of stages	2	1	1	2	3	2	1
Chemical or Standard Duty	Chemical	Chemical	Chemical	Chemical	Chemical	Chemical	Chemical
Motor, HP(watts)						85	85
Motor RPM	3000	3000	2000	1500	1500	700-2200	700-2200
Amps@1700 RPM, Ult. Vac. Pressure	2.8	2.8	5.6	5.6	4.3	2	2
Inlet connection	DN8 Hose Nozzle	DN8 Hose Nozzle	DN8 Hose Nozzle	DN8 Hose Nozzle	DN8 Hose Nozzle	¼" hose barb	¼" hose barb
Outlet connection	DN8 Hose Nozzle	DN8 Hose Nozzle	DN8 Hose Nozzle	DN8 Hose Nozzle	DN8 Hose Nozzle	¼" hose barb	¼" hose barb
Weight lbs.(kg)	1.8(0.8)	1.8(0.8)	9.3(4.2)	9.9(4.5)	9.9(4.5)	12.5(7)	12.5(7)
Overall Dimensions LxWxH in(cm)	4.0x 1.9x 5.5 (10x5x14)	4.0x 1.9x 5.5 (10x5x14)	8.0x5.1x 7.9 (20x13x20)	8.0x5.1x 7.9 (20x13x20)	8.0x3.8x 10.1 (20x10x26)	9.5x4.7x6.1 (24x12x16)	9.5x4.7x6.1 (24x12x16)
Ship Weight lbs.(kg)	6.6(3)	6.6(3)	17.6(8)	22(10)	19.8(9)	17(7.7)	17(7.7)
Shipping Carton Dimensions LxWxH in.(cm)	11x8.6x3.9 (28x22x10)	11x8.6x3.9 (28x22x10)	14.2x11x18.5 (36x28x47)	14.2x11x 18.5 (36x28x47)	14.2x11x 18.5 (36x28x47)	14x14x14 (36x36x36)	14x14x14 (36x36x36)
Ordering Information							
24V DC Brushless	420306-03	420307-01	412421-03	412642-03	412443-04	8115D-20	---
230V 50Hz	---	---	---	---	---	8115C-02	8157C-02
115V 60Hz	---	---	---	---	---	8115B-01	8157B-01

Notes: 1. 8115 and 8157 are not CE approved.

Models MPR 030 Z and MPR 060 E are compact diaphragm vacuum pumps for small instruments. Wetted surfaces resist chemical attack. Materials of construction include PTFE layer diaphragms, PEEK heads and valves. Recommend operating the pump with an external fan.

MPR 030 Z

Models MPC 110 E, MPC 155 Z and MPC 105 T come with mounting brackets for installation vertically inside instrumentations. Materials of construction include PTFE heads, PTFE layer diaphragms and PEEK valves.

MPC 105 T

Models 8115 and 8157 employ patented tangential diaphragm technology that offers the performance of a 4-head diaphragm pump with only 2 diaphragms and pump heads. The efficient design creates more flow in a smaller pump volume and fewer wear parts compared to competitive technology. All wetted surfaces are of chemically resistant fluorinated plastics: PTFE heads, PTFE layer diaphragms and FFKM valves.

8115

LVS systems are designed for solvent distillation / evaporation applications and comprise an oil-free, chemical duty diaphragm pump with optional control packages, liquid containment and exhaust vapor condenser for optimal solvent recovery.

- Wide choice of performance
  Available with 2 or 3 pumping stages to generate vacuum as low as 2mbar (1.5torr).
  Flow rate choices from 20 to 238L/min
- Modular design with options to complement your process.
  Digital control options and on board accessories tailor the LVS to your needs.
- Resistant to acid and solvent vapors
  Wetted parts in PTFE, PVDF, PEEK, PP and glass.
- Ergonomic design places controls and features where they are needed.
  Free up hood or bench space.

The LVS systems are available with a range of vacuum control options; unregulated, manually regulated and three different electronic control packages are available.

LVS 300 Z

Unregulated

- When ultimate vacuum is required at all times.

LVS 301 Z

Manually regulated

- A fine control valve is used to regulate the vacuum by acting as a bleed valve. Options available with one or two manual regulators.

LVS 310 Z

Standard digital control (cv)

- The standard electronic control package uses a chemically resistant solenoid valve to control the process vacuum while the pump runs continually.
- The user defined vacuum and hysteresis levels are used to open and close the control valve thus maintaining vacuum at the process between the high and low control points. This is known as two point control.

LVS 310 Z en

Economic digital control (en)

- Economic control uses the same two point control system, but as cv replaces the control valve with a relay which turns the pump on and off to maintain the process vacuum between the user defined vacuum and hysteresis levels. This method greatly reduces power consumption and extends the lifetime of the pump.
- Economic control is particularly useful for multi-user vacuum networks where the pump is located away from the user.

LVS 310 Z ef

Ecoflex digital control (ef)

- Ecoflex control varies the speed of the pump constantly to maintain the user defined vacuum level regardless of changes in the process requirements.
- The Ecoflex method exhibits genuine single point (hysteresis-free) control and therefore a stable vacuum level.
- Single point control results in up to 40% increase in evaporation rates with minimal bumping or foaming of precious samples. This is particularly important in ultimate rotary evaporation.

LVS Systems | Final Pressure <8 mbar

Model
LVS 110 Z

Model
LVS 300 Z

Model
LVS 301 Z

CE

Specifications

Model Final pressure <8 mbar	LVS 101 Z w/gauge	LVS 110 Z	LVS 300 Z	LVS 301 Z	LVS 301 Z w/gauge
Free Air Displacement					
m^3/hr (l/min) @ 50Hz	1.0 (16.7)	1.0 (16.7)	2.3 (38.3)	2.3 (38.3)	2.3 (38.3)
cfm(l/min) @60Hz	0.6 (16.7)	0.6 (16.7)	1.3 (38)	1.3 (38)	1.3 (38)
Ult. Vac. Pressure, mbar (torr)	8 (6)	8 (6)	8 (6)	8 (6)	8 (6)
Vacuum Control Type	**Manual**	**Two Point**	**Unregulated**	**Manual**	**Manual**
Number of Vacuum Connections	1	1	1	1	1
Vacuum Display Type	Dial Gauge	Digital VCZ 521	-------	-------	Dial Gauge
Inlet/Exhaust Connection Type	Hose nozzle	Hose nozzle	Hose nozzle	Hose nozzle	Hose nozzle
Tubing Needed I.D. in.(mm)	DN8	DN8	DN8	DN8	DN8
Coolant Tubing Needed	8 mm I.D.	8 mm I.D.	8 mm I.D.	8 mm I.D.	8 mm I.D.
Sound level, dB(A)	< 44	< 44	< 44	< 44	< 44
Motor Power watts(HP)	60(0.08)	60 (0.08)	180(0.25)	180(0.25)	180(0.25)
Type of Motor Protection, IP	IP 54	IP 54	IP 54	IP 54	IP 54
Weight, lbs.(kg)	25.6(11.6)	25.8(11.7)	35.5(16.1)	36(16.3)	36(16.3)
Overall Dimensions WxDxH in.(cm)	14.2x12.2x17.7 (36x31x45)	14.2x12.2x17.7 (36x31x45)	14.2x12.2x15.7 (36x31x40)	14.2x12.2x17.7 (36x31x45)	14.2x12.2x17.7 (36x31x45)
Ordering Information					
230V 50/60Hz 1Ph [1]	115027	115024	115041	115047	115047-10
115V 50/60Hz 1Ph [2]	115027-01	115024-01	115041-01	115047-01	115047-11

Notes: 1. With Schuko and UK plug leads. 2. With US plug lead. 3. With JP plug lead. 4. These pumps can be delivered on request

Applications

Laboratory Vacuum Systems(LVS)

LVS systems are specially designed for laboratory applications such as distillation, evaporation and drying. They comprise an oil-free chemical duty diaphragm pump (MPC) with optional control packages, liquid containment and exhaust vapor condenser. All wetted parts are made from high quality chemically resistant materials with clear plastic coated glassware to allow solvent and acid vapors to be pumped.

LVS 310 Z

Display Types

Digital VCZ 521
Vacuum Controller

LED VCZ 424
Vacuum Controller

Model
LVS 302 Z

Model
LVS 310 Z

Model
LVS 311 Z

Model
LVS 320 Z

Model
LVS 610 T en

LVS 302 Z	LVS 310 Z	LVS 311 Z	LVS 320 Z (424)	LVS 310 Z en	LVS 610 T en
2.3 (38.3)	2.3 (38.3)	2.3 (38.3)	2.3 (38.3)	2.3 (38.3)	4.5 (75)
1.3 (38)	1.3 (38)	1.3 (38)	1.3 (38)	1.5 (41)	2.9 (81)
8 (6)	8 (6)	8 (6)	8 (6)	8 (6)	2 (1.5)
Manual	**Two Point**	**Manual & Two Point**	**Two Point**	**Economic**	**Economic**
2	1	2	2	1	1
-------	Digital VCZ 521	Digital VCZ 521	LED VCZ 424	Digital VCZ 521	Digital VCZ 521
Hose nozzle	Hose nozzle	Hose nozzle	Hose nozzle	Hose nozzle	Hose nozzle
DN8	DN8	DN8	DN8	DN8	DN8
8 mm I.D.	8 mm I.D.	8 mm I.D.	8 mm I.D.	8 mm I.D.	8 mm I.D.
< 44	< 44	< 44	< 44	< 44	< 44
180(0.25)	180(0.25)	180(0.25)	180(0.25)	180(0.25)	370(0.5)
IP 54	IP 54	IP 54	IP 54	IP 54	IP 54
36(16.3)	39.2(17.8)	40(18.1)	40.6(18.4)	38.6(17.5)	54.5(24.7)
14.2x12.2x17.7 (36x31x45)	14.2x12.2x17.7 (36x31x45)	14.2x12.2x17.7 (36x31x45)	14.2x12.2x17.7 (36x31x45)	13.8x12.6x17.3 (35x32x44)	13.8x12.6x17.3 (35x32x44)
115043	115044	115045	115046	115248-02	115258-02
115043-01	115044-01	115045-01	115046-01	115248-03	115258-03

Scope of Delivery:

- Chemical duty diaphragm pump mounted on chassis
  ON/OFF switch and internal protective thermal switch for the motor, mains cable and plug
- Vibration isolating feet
- Inlet separator
- Exhaust condenser (except for LVS 300 Z)
- Gas ballast valve (except for LVS 105 T - 10 ef)
- 8mm inlet / exhaust hose nozzle

Vacuum Control

Unregulated; no vacuum Control

Manual; vacuum is adjusted by user

Two Point vacuum is automatically controlled at set point using on/off solenoid valve

Ecoflex; pump speed is automatically controlled by vacuum controller

Economic; pump automatically turns on/off based on demand for vacuum

Accessories

Component	page
• Replacement Condensor	71
• Hose	67
• Service Kits	82

LVS Systems | Final Pressure <2 mbar

Model LVS 201 T

Model LVS 210 T

Model LVS 600 T

Model LVS 601 T

Specifications

Model Final pressure <2 mbar	LVS 201 T	LVS 201 T w/ gauge	LVS 210 T	LVS 600 T	LVS 601 T
Free Air Displacement					
m^3/h (l/min) @ 50Hz	1.8 (30)	1.8 (30)	1.8 (30)	4.5 (75)	4.5 (75)
cfm (l/min) @60Hz	1.2 (33)	1.2 (33)	1.2 (33)	2.6 (75)	2.6 (75)
Ult. Vac. Pressure, mbar(torr)	< 2 (1.5)	< 2 (1.5)	< 2 (1.5)	< 2 (1.5)	< 2 (1.5)
Vacuum Control Type	**Manual**	**Manual**	**Two Point**	**Unregulated**	**Manual**
Number of Vacuum Connections	1	1	1	1	1
Vacuum Display Type	-------	-------	Digital VCZ 521	-------	-------
Inlet/Exhaust Connection Type	Hose nozzle	Hose nozzle	Hose nozzle	Hose nozzle	Hose nozzle
Tubing Needed I.D. in.(mm)	DN8	DN8	DN8	DN8	DN8
Coolant Tubing Needed	8 mm I.D.	8 mm I.D.	8 mm I.D.	8 mm I.D.	8 mm I.D.
Sound level, dB(A)	< 44	< 44	< 44	< 44	< 44
Motor Power watts(HP)	90(0.12)	90(0.12)	90(0.12)	370(0.5)	370(0.5)
Type of Motor Protection, IP	IP 54	IP 54	IP 54	IP 54	IP 54
Weight, lbs.(kg)	15.0	15.3	15.7	23.2	23.50
Overall Dimensions WxDxH in.(cm)	14.2x12.2x 17.7 (36x31x45)	14.2x12.2x 17.7 (36x31x45)	14.2x12.2x 17.7 (36x31x45)	14.2x12.2x 15.6 (36x31x40)	14.2x12.2x 17.7 (36x31x45)
Ordering Information					
230V 50/60Hz	115037	115037-10	115034	115051	115057
115V 50/60Hz	115037-01	115037-11	115034-01	115051-01	115057-01

Notes: 1. With Schuko and UK plug leads. 2. With US plug lead. 3. With JP plug lead. 4. These pumps can be delivered on request

Applications

Laboratory Vacuum Systems(LVS)

LVS systems are specially designed for laboratory applications such as distillation, evaporation and drying. They comprise an oil-free chemical duty diaphragm pump (MPC) with optional control packages, liquid containment and exhaust vapor condenser. All wetted parts are made from high quality chemically resistant materials with clear plastic coated glassware to allow solvent and acid vapors to be pumped.

LVS 610 T

Display Types

Digital VCZ 521
Vacuum Controller

LED VCZ 424
Vacuum Controller

Model LVS 602 T

Model LVS 610 T

Model LVS 611 T

Model LVS 620 T

Model LVS 1210 T

	LVS 601 T w/gauge	LVS 602 T	LVS 610 T	LVS 611 T	LVS 620 T (424)	LVS 1210 T
	4.5 (75)	4.5 (75)	4.5 (75)	4.5 (75)	4.5 (75)	8.3 (138)
	2.6 (75)	2.6 (75)	2.6 (75)	2.6 (75)	2.6 (75)	4.9 (138)
	< 2 (1.5)	< 2 (1.5)	< 2 (1.5)	< 2 (1.5)	< 2 (1.5)	< 2 (1.5)
	Manual	**Manual**	**Two Point**	**Manual & Two Point**	**Two Point**	**Two Point**
	1	2	1	2	2	1
	-------	-------	Digital VCZ 521	Digital VCZ 521	LED VCZ 424	VCB 521 es
	Hose nozzle	Hose nozzle	Hose nozzle	Hose nozzle	Hose nozzle	Hose nozzle
	DN8	DN8	DN8	DN8	DN8	DN8
	8 mm I.D.	8 mm I.D.	8 mm I.D.	8 mm I.D.	8 mm I.D.	8 mm I.D.
	< 44	< 44	< 44	< 44	< 44	< 44
	370(0.5)	370(0.5)	100(0.5)	370(0.5)	370(0.5)	370(0.5)
	IP 54	IP 54	IP 54	IP 54	IP 54	IP 54
	23.50	23.5	24.7	25.0	25.3	36.1
	14.2x12.2x 17.7 (36x31x45)	14.2x12.2x 17.7 (36x31x45)	14.2x12.2x 17.7 (36x31x45)	14.2x12.2x 17.7 (36x31x45)	14.2x12.2x 17.7 (36x31x45)	14.2x12.2x 17.7 (36x31x45)
	115057-10	115053	115054	115055	115056	115064
	115057-11	115053-01	115054-01	115055-01	115056-01	115064-01

Scope of Delivery:

- Chemical duty diaphragm pump mounted on chassis
  ON/OFF switch and internal protective thermal switch for the motor, mains cable and plug
- Vibration isolating feet
- Inlet separator
- Exhaust condenser (except for LVS 300 Z)
- Gas ballast valve (except for LVS 105 T - 10 ef)
- 8mm inlet / exhaust hose nozzle

Vacuum Control

Unregulated; no vacuum Control

Manual; vacuum is adjusted by user

Two Point vacuum is automatically controlled at set point using on/off solenoid valve

Ecoflex; pump speed is automatically controlled by vacuum controller

Economic; pump automatically turns on/off based on demand for vacuum

Accessories

Component	page
• Replacement Condensor	71
• Hose	67
• Service Kits	82

Model
LVS 310 Z ef

Model
LVS 105 T-10 ef

Model
LVS 210 T ef

CE

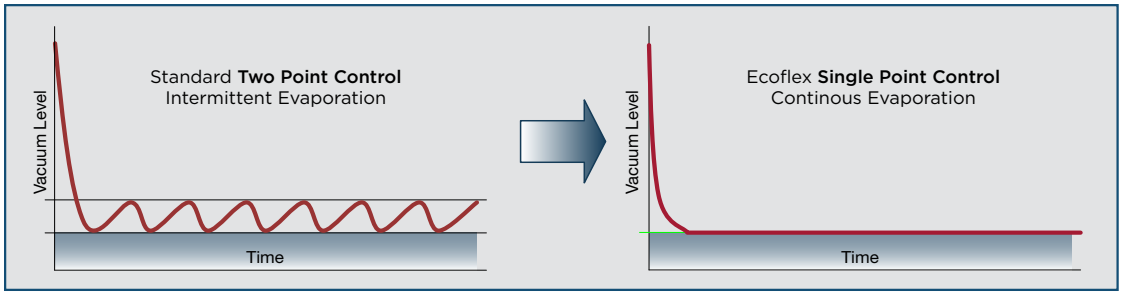
Specifications

Model Final pressure <8 mbar	LVS 310 Z ef	LVS 105 T -10ef	LVS 210 T ef	LVS 610 T ef	LVS 1210 T ef
Free Air Displacement					
m^3/hr @ 50Hz	2.6	1.2	2.2	4.9	9.1
cfm(l/min) @60Hz	1.5(41)	0.7(20)	1.3(36)	2.9(81)	5.3(151)
Ult. Vac. Pressure, mbar(torr)	< 8	< 2	< 2	< 2	< 2
Vacuum Control Type	Ecoflex	Ecoflex	Ecoflex	Ecoflex	Ecoflex
Number of Vacuum Connections	1	1	1	1	1
Vacuum Display Type	Digital VCZ 521	Digital VCZ 521	Digital VCZ 521	Digital VCZ 521	Digital VCZ 521
Inlet/Exhaust Connection Type	Hose nozzle	Hose nozzle	Hose nozzle	Hose nozzle	Hose nozzle
Tubing Needed I.D. in.(mm)	DN8	DN8	DN8	DN8	DN8
Coolant Tubing Needed	8 mm I.D.	8 mm I.D.	8 mm I.D.	8 mm I.D.	8 mm I.D.
Sound level, dB(A)	< 44	< 44	< 44	< 44	< 44
Motor Power watts(HP)	180(0.25)	90(0.12)	90(0.12)	370(0.5)	370(0.5)
Type of Motor Protection, IP	IP 54	IP 54	IP 54	IP 54	IP 54
Weight, lbs.(kg)	43.9(19.9)	20.9(9.5)	41.9(19.0)	59.1(26.8)	81.8(37.1)
Overall Dimensions WxDxH in.(cm)	13.8x12.6x17.3 (35x32x44)	9.8x10.2x17.3 (25x26x44)	13.8x12.6x17.3 (35x32x44)	13.8x12.6x17.3 (35x32x44)	21.3x13x18.1 (54x33x46)
Ordering Information					
90V to 260V 50/60Hz 1Ph [3]	------	115184	------	------	------
230V 50/60Hz 1Ph [1]	115244	------	115234	115254	115264

Notes:
1. With Schuko and UK plug leads. 2. With US plug lead 3. With Schuk, UK and US plug leads

Ecoflex preserves your sample while evaporating up to 40% faster

Ecoflex – ef control varies the speed of the pump constantly to maintain the user defined vacuum level regardless of changes in the process requirements. Variability is greatly reduced with the Ecoflex method and therefore the process will see genuine single point (hysteresis-free) control with stable vacuum level. Single point control results in up to 40% increase in evaporation rates with minimal bumping or foaming of precious samples.

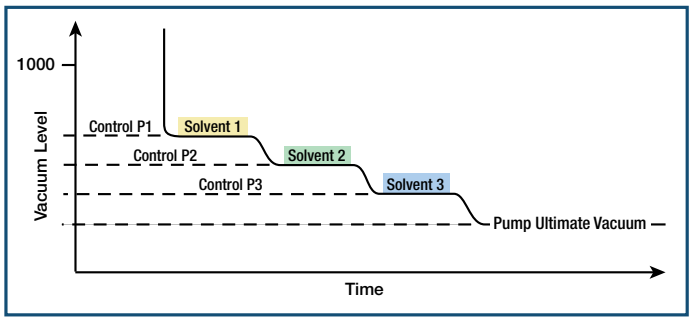


Without foaming & bumping

- Smooth distillations of multiple sovent systems
- Automatically moderates vacuum for each solvent fraction
- Distills any solvent / volume mixture without compositon knowledge

Hold Back Pumps create a fully-automatic distillation process without attention to fraction quantities, manual adjustment, or continuous regulation. The resultant distillation is considerably better and more economically sound than using a diaphragm pump system with a solenoid valve.

The outstanding design of the Hold Back Pump utilizes solvent flow to automatically regulate the diaphragm pump vacuum level.



Note: HBP is supplied with condenser, solvent recovery, digital control panel, DN 8 hose connector and vacuum sensor.

Holdback Pump Model HBP 101

Specifications	
Model	**HBP 101**
Free Air Displacement	
m3/h(L/min)@50Hz	2.3(38)
cfm(L/min)@60Hz	1.45(41)
Ultimate pressure, mbar(torr)	15(11.2)
IN/EX hose connector [Tubing Needed, I.D. mm(in.)]	DN 8 [8(0.32)]
Sound level, dB(A)	42
Motor Power, watts(HP)	200(0.27)
Weight, kg(lbs.)	18.8(41.4)
Overall Dimensions WxDxH in.(cm)	12.9x11.3x20.4 (31x27x49)
Ordering Information	
230V, 50/60Hz With Schuko and UK plug leads	112036
115V, 50/60Hz With US plug lead	112036-01

- **Intelligent vacuum control**
- **Chemical resistant**
- **Oil-free, energy efficient and low maintenance**

The WelchNet Titan is a microprocessor controlled system of high capacity PTFE diaphragm pumps. The pumps work individually or in tandem as your laboratory vacuum demand requires, holding vacuum level even if an individual pump needs maintenance.

Titan is mounted on a mobile base frame - easily positioned for adaptation to existing plumbing. Titan-4 and Titan-6 are systems utilizing 4 or 6 PTFE diaphragm pumps to provide efficient vacuum on demand for up to 30 separate users.

Titan Model 2624

The individual pumps start up in tandem and are successively switched off as working vacuum pressure is attained. One or more pumps come on in response to vacuum demand, rotating usage to distribute pump wear and extend maintenance interval.

Specifications						
Model	2614	2624	2634	2616	2626	2636
Number of Pumps in System	4	4	4	6	6	6
Pump Speed, l/min (CFM) @60Hz	300 (10.6)	480 (17)	640 (22.6)	486 (14.8)	750 (26.5)	906 (32.0)
Pump Speed, m^3/hr (l/min) @50Hz	15 (250)	24 (400)	32 (533)	27.0 (450)	37.5 (625)	49.8 (828)
Ultimate pressure, torr (mbar)	<1.5 (<2)	<6 (<8)	<56 (<75)	<1.5 (<2)	<6 (<8)	<56 (<75)
Amp required @230V 60Hz 1Ph	10.4	10.4	10.4	15.6	15.6	15.6
Overall Dimensions LxWxH in. (cm)	15 x 37 x 26 (38x94x66)	15 x 37 x 26 (38x94x66)	15 x 37 x 26 (38x94x66)	15 x 51 x26 (38x130x66)	15 x 51 x26 (38x130x66)	15 x 51 x 26 (38x130x66)
Inlet and exhaust connection	NW25	NW25	NW25	NW25	NW25	NW25
Weight, lbs (kg)	216 (98)	216 (98)	216 (98)	308 (140)	308 (140)	308 (140)
Ordering Information						
230V 50/60Hz 1Ph	2614C-01	2624C-01	2634C-01	2616C-01	2626C-01	2636C-01

Standard Duty Dry Vacuum Pumps | WOB-L Piston

Model 2511

Models 2522 / 2534

Model 2546

Models 2567 / 2561

CE

Specifications	Vacuum/Pressure Pumps				
Model	**2511**	**2522**	**2534**	**2546**	**2561**
Free Air Displacement					
cfm (l/min.)@60Hz	0.39 (11)	0.76 (22)	1.2 (34)	1.6 (45)	2.3 (65)
m^3/hr (l/min.)@50Hz	0.55 (9.2)	1.1 (18)	1.7 (28)	2.3 (38)	3.4 (57)
Ult. Vac. Pressure, torr(mbar)	219 (292)	100 (133)	70 (93)	60 (80)	5 (6.7)
Max Pressure PSIG (pascal)	33 (3.3 x 105)	100 (106)	50 (5 x 105)	100 (106)	---
Maximum Vacuum, in. Hg	21.3	26	27.2	27.6	29.8
Motor Horsepower (watts)	1/30 (25)	1/8 (93)	1/8 (93)	1/4 (190)	1/3 (250)
Tubing Needed, I.D. in. (mm)	3/16 (5)	3/16 (5)	3/16 (5)	3/16 (5)	1/4 (7)
Intake/Exhaust Thread NPT	3/16 in. Hose	1/4	1/4	1/4	1/4
Weight lbs.(kg)	5 (2.3)	11.7 (5.3)	11.7 (5.3)	13.8 (6.3)	16.5 (7.5)
Overall Dimensions L x W x H in. (cm)	7.6x4.5x7.5 (19x11x19)	8.1x8.8x10 (21x22x25)	8.1x8.8x10 (21x22x25)	10x7.5x9 (25x19x8)	17.3x6.5x10.5 (44x17x27)
Ship Weight, lbs. (kg)	6 (2.7)	17 (7.7)	17 (7.7)	17 (7.7)	24 (10.9)
Shipping Carton Dimensions L x W x H in. (cm)	11x7x8.3 (28x18x21)	15.3x12.3x12.7 (39x31x32)	15.3x12.3x12.7 (39x31x32)	15.3x12.3x12.7 (39x31x32)	21x12x15 (53x30x38)
Ordering Information					
Wired for 115V, 60Hz, 1 Ph with N. American 115V Plug	2511B-01 [3]	2522B-01 [4]	2534B-01 [4]	2546B-01 [4]	2561B-50
Wired for 230V, 60Hz, 1 Ph with N. American 230V Plug	---	---	2534C-01 [4, 7]	2546C-01 [4, 7]	---
Wired for 230V, 50Hz, 1 Ph2. with Cont. Euro.(Schuko) Plug	2511C-02 [3]	2522C-02 [4, 6]	2534C-02 [4, 6, 7]	2546C-02 [4, 6, 7]	2561C-50 [6, 7, 8]
Wired for 100V, 50/60Hz, 1 Ph with a plug	2511C-05 [3, 5]	2522C-05 [4, 5]	---	---	---

Applications

Vacuum/Pressure Standard Duty Dry Vacuum Pumps

- Ultimate to <5 torr (6.7 mbar)
- Lightweight, compact pump
- Inlet liquid trap with vacuum regulator

Oil-free operation for reduced maintenance. These WOB-L piston pumps have a high water vapor tolerance. Pumps come with inlet liquid trap, mounted vacuum gauge and vacuum regulator (except 2511 and 2562).

Note: Standard Duty Dry Pumps are not recommended for pumping organic, acidic or basic vapors.

Model 2585B-50

Model
2562B-01

Models
2585 / 2581

Model
2511B-75

Model
2515B-75

Standard Duty Vacuum Pumps				Aspiration/Filtration Systems	
2562	**2567**	**2581**	**2585**	**2511**	**2515**
2.3 (65)	3.5 (100)	3.5 (100)	7.1 (201)	0.39 (11)	1.2 (34)
3.4 (57)	4.9 (83)	4.9 (83)	10 (168)	0.55 (9.2)	1.7 (28)
7.5 (10)	60 (80)	5 (6.7)	60 (80)	219 (292)	70 (93)
---	---	---	---	33 (3.3 x 105)	---
29.6	27.6	29.8	27.6	21.3	27.2
1/3 (250)	1/3 (250)	1/3 (250)	1/3 (250)	1/30 (25)	1/8 (93)
3/8 (10)	1/4 (7)	1/4 (7)	1/4 (7)	3/16 (5)	3/16 (5)
1/4	1/4	3/8	3/8	3/16 in. Hose	1/4
16.5 (7.5)	16.5 (7.5)	24.5 (11.1)	24.5 (11.1)	5.7 (2.6)	13.2 (6.0)
17.0x7.5x12 (43x19x31)	15.0x10x10 (38x25x25)	17x7.5x12 (43x42x19)	17x7.5x12 (43x42x19)	11.0x8.3x10.0 (28x21x25)	14.8x8.3x10.0 (37.5x21x25.5)
24 (10.9)	24 (10.9)	32 (14.5)	32 (14.5)	11.0 (5)	14.8 (6.7)
21.5x12.5x16 (55x32x31)	21x12x15 (53x30x38)	21x12x15 (53x30x38)	21x12x15 (53x30x38)	15.3x12.3x12.7 (39x31x32)	21x12x15 (53x30x38)
2562B-01	2567B-50	2581B-50	2585B-50	2511B-75	2515B-75
---	---	---	---	---	---
---	2567C-50 [6, 7, 8]	2581C-50 [6, 7, 8]	2585C-50 [6, 7, 8]	2511C-75 [6, 7, 8]	2515C-75 [6, 7]
---	---	---	---	2511C-76 [5]	2515C-76

Notes:

1. All models are recommended for pumping vapors of aqueous solutions including buffers, but not for acidic, basic or organic vapors or gases.
2. Units supplied with CE marking.
3. Model 2511 can deliver 33 PSIG (3.3 x 10^5 pascal).
4. Models 2522, 2534 and 2546 come with vacuum (and pressure) regulator, vacuum (and pressure) gauge, silencer and water trap. Models 2522 and 2546 can deliver 100 PSIG (10^6 pascal). Model 2534 can deliver 50 PSIG (5 x 10^5 pascal).
5. Comes with PSE mark.
6. Included is UK and Schuko cord sets.
7. Motor can operate at 230V, 50/60Hz, 1Ph.
8. For 230V in US, order cord 61-8707.

Aspiration / Filtration Systems

Systems collect waste into 1.2 Liter autoclaveable reservoir. Both models enable vacuum measurement and regulation. Reservoirs are protected from overflow by float valve; inlet line hydrophobic filter further protects pump. Includes 6 ft. tubing and 2 filters. See p. 10 for more information. For accessories, like pipettor system and foot switches, see page 78.

Model
2511B-75

Model
2515B-75

For a Complete System

Component	page
• Traps	69
• Inlet / Exhaust Accessories	69, 71
• Hose	67
• Gauges	76
• Service Kits	80 - 81
• Replacement Jars	79

Models 2562/2563 /2567

Models 2580 / 2585

Model 2581

Model 2595

Specifications	Vacuum/Pressure Pumps						
Model	**2562**	**2563**	**2567**	**2580**	**2581**	**2585**	**2595**
Free Air Displacement							
cfm (l/min.)@60Hz	2.3(65)	2.3(65)	3.5(100)	3.5(99)	3.5(100)	7.1(201)	10.6(300)
m^3/hr (l/min.)@50Hz	3.4(57)	3.4(57)	4.9(83)	4.9(83)	5.0(83)	10(168)	15(250)
Ult. Vac. Pressure, torr(mbar)	9(12)	5(6.7)	60(80)	9(12)	4(5)	60(80)	60(80)
Maximum Vacuum, in. Hg	29.6	29.6	27.6	29.6	29.8	27.6	27.6
Mechanism	Piston	Piston	Piston	Piston	Piston	Piston	Piston
Type of Duty	Standard	Standard	Standard	Standard	Standard	Standard	Standard
Motor Horsepower(watts)	1/3(250)	1/3(250)	1/3(250)	1/3(250)	1/3(250)	1/3(250)	1/3(250)
Tubing Needed, I.D. in.(mm)	1/4(7)	1/4(7)	1/4(7)	3/8(10)	3/8(10)	3/8(10)	5/8(16)
Inlet Connection	----	NW 16[1]	----	----	NW 25[2]	----	----
Intake/Exhaust Thread NPT	1/4	1/4	1/4	3/8	3/8	3/8	1/2
Weight lbs.(kg)	16.5(7.5)	16.5(7.5)	16.5(7.5)	22.5(10.3)	22.5(10.3)	22.5(10.3)	22.5(10.3)
Overall Dimensions L x W x H in.(cm)	11.7x7.2x9.5 (30x18x24)	11.7x7.2x9.5 (30x18x24)	11.7x7.2x9.5 (30x18x24)	13.3x7.8x11.7 (34x20x30)	13.3x7.8x11.7 (34x20x30)	13.3x7.8x11.7 (34x20x30)	13.3x7.8x12.8 (34x20x33)
Ship Weight, lbs.(kg)	18(8.2)	18(8.2)	18(8.2)	28(12.7)	28(12.7)	28(12.7)	28(12.7)
Ordering Information							
Wired for 115V, 60Hz, 1 Ph with N. American 115V Plug	2562B-01	2563B-24	2567B-01	2580B-01	2581B-24	2585B-01	2595B-01
Wired for 230V, 50Hz, 1 Ph withIEC connnnnnection	2562C-02	2563C-24	2567C-02	2580C-02	2581C-24	2585C-02	2595C-02

Notes:
1. Dual inlet flange ISO NW16 with 1/4 in.(7mm) hose barb supplied which will thread into NW16.
2. Dual inlet flange ISO NW25 with 1/4 in.(7mm) hose barb supplied which will thread into NW25.

Applications

Vacuum Standard Duty Dry Vacuum Pumps

- Ultimate to 4 torr (5 mbar)
- Lightweight, compact pump

Oil-free operation for reduced maintenance. These WOB-L piston pumps have a high water vapor tolerance.

Note: Standard Duty Dry Pumps are not recommended for pumping organic, acidic or basic vapors.

Model 2580B-01

Model 2050

Model 2060

- **Powerful, Portable, & Economical**
- **Lab or Field Usage**
- **Advanced Chemical Resistance**

Quiet GEMINI pumps use DC motors, powered by an AC adapter unit in the lab or a 12 VDC adapter for your vehicle.

GEMINI gives you enhanced chemical resistance - tolerant beyond aqueous fumes for use with solvents and weak acids/bases. GEMINI's high performance components will not corrode. Chemical resistance is built in with polyarylamide heads and fluoropolymer elastomer diaphragms, tubing and valves. The oil-free dry pump design provides top performance in a portable durable package.

For convenient vacuum readout and regulation, order Model 2060. Not recommended for use with strongly acidic or basic fumes. For organic fume applications, check for chemical compatibility with fluoropolymer elastomer. Not recommended for rotary evaporator, concentrator, or vacuum oven applications. See PTFE dry vacuum pumps and systems (p. 26 - 31) for applications requiring higher vacuum/flow with harsh or aggressive chemicals.

Specifications		
Model	**2050**	**2060**
Free Air Displacement		
cfm (l/min.)	0.46(13)	0.46(13)
Ultimate Pressure, torr(mbar)[1]	200(266)	200(266)
Vacuum Regulator & Gauge	No	Yes
Max Vacuum, in. Hg	22	22
Tubing, I.D. in.(mm)	3/8(10)	3/8(10)
Overall Dimensions LxWxH in.(cm)	7.6x4.5x7.5 (19.4x11.4x19.1)	9.25x7.25x8.5 (23.5x18.4x21.6)
Weight, lbs.(kg)	5.3(2.4)	11(5)
Ship Weight, lbs.(kg)	7(3.2)	13(5.9)
Ordering Information[1]		
115V, 60Hz w/N. American 115V plug	2050B-01	2060B-01
230V, 50Hz, w/Cont. Euro.(Schuko) Plug	2050C-02[2]	2060C-02[2]

Notes:
1. All Cat. Nos. include a +12V DC auto adapter.
2. Cat. Nos. 2050C-02 and 2060C-02 come with CE mark.

Model 8150

- **Vauum pump mounted on a 10 gal(38 L) tank**
- **Vacuum reservoir for instant vacuum availability**
- **WOB-L pump is tolerant of line moisture**

Use this durable 10 gallon vacuum tank system for smooth operation of light industrial processes. Simplex tank mounted standard duty WOB-L® piston pump provides powerful vacuum (to 27.6" Hg). Moisture tolerance is far superior to that of dry graphite vane vacuum pumps.

System includes ASME code receiver, vacuum gauge, exhaust muffler and manual shutoff valve. The three position switch allows for on/off continuous duty or automatic on/off at a set vacuum level. 115V, 6 ft. power cord, shipped fully assembled.

Applications

- Pick and Place operations
- Modular vacuum networks
- Small scale vacuum forming
- Vacuum chucking

Specifications	
Model	**8150**
Free Air Displacement	
cfm (l/min.) @60Hz	7.1(201)
Ultimate Pressure, torr(mbar)[1]	60(80)
Max Vacuum, in. Hg	27.6
Tank Volume, gal.(liters)	10(38)
Inlet/ Outlet connections, in. FNPT	1/4
Tubing, I.D. in.(mm)	1/4(6)
Weight, lbs.(kg)	64(29)
Overall Dimensions LxWxH in.(cm)	30 x 11 x 23 (76x28x58)
Ship Weight, lbs.(kg)	124(48.8)
Shipping Crate Dimensions LxWxH in.(cm)	35x16x28 (89x41x58)
Ordering Information	
115V, 60Hz w/N. American 115V plug	8150B-30

Oil Free Deep Vacuum | Chemstar Dry

Model 2070

Model 2071

Model 2080

- **Oil-free deep vacuum.**
- **Chemically resistant**
- **Plug and Play operation**

ChemStar Dry vacuum system is an alternative to oil-sealed rotary vane pumps for chemical applications requiring a deep vacuum. The deep, oil-free vacuum is generated by a proprietary vacuum roots blower backed by a PTFE diaphragm pump. All major parts in contact with pumped vapor/gases are made of chemically resistant fluoroplastics or coated with a proprietary PTFE coating.

Pump speed across the entire operating pressure range – atmospheric to deep vacuum - is controlled using patented control software technology. The control software provides plug-and-play operation.

Service interval is extended by integrated self-cleaning function that purges condensed vapors in the pump at shut-down.

A foreline catchpot trap is recommended to prevents ingestion of liquids. A foreline cold trap is recommended to prevent sticky-substances from entering pump and to protect pump from flash evaporation applications (ie vacuum ovens) that generate high vapor load exceed pumping capacity.

Specifications			
Model	**2070**	**2071**	**2080**
Free Air Displacement			
cfm(l/min) @ 2 torr (2.7 mbar)	6.9 (196)	6.9 (196)	12.4 (350)
Ult Vac. Pressure (torr (mbar) @60 Hz	0.05 (0.07)	0.095 (0.13)	0.04 (0.05)
Ult Vac. Pressure, torr (mbar) @50 Hz	0.07 (0.09)	—	0.04 (0.05)
Running Amps	3	3	3
Intake and Exhaust Connection	NW25	NW25	NW25
Weight, lb (kg)	50 (23)	50 (23)	88 (40)
Overall Dimensions, LxWxH, in (cm)	18 x 8 x 18 (46 x 22 x 47)	18 x 8 x 18 (46 x 22 x 47)	23 x 11 x 18 (57 x 27 x 45)
Ship Weight, lb (kg)	75 (34)	75 (34)	115 (52)
Shipping Carton Dimensions, LxWxH, in (cm)	26.5x 26.5 x 27(68 x 68 x 69)	26.5x 26.5 x 27 (68 x 68 x 69)	26.5x 26.5 x 27 (68 x 68 x 69)
Ordering Information			
Wired for 115V, 60 Hz, 1 Ph, N American 115V Plug	2070B-01	2071B-01	2080B-01
Wired for 230V, 50 Hz, 1 Ph, Shucko and UK 230V Plugs	2070C-02	—	2080C-02
Wired for 230V, 60 Hz, 1 Ph, 230V NA plug	2070C-01	2071C-01	2080C-01

Applications

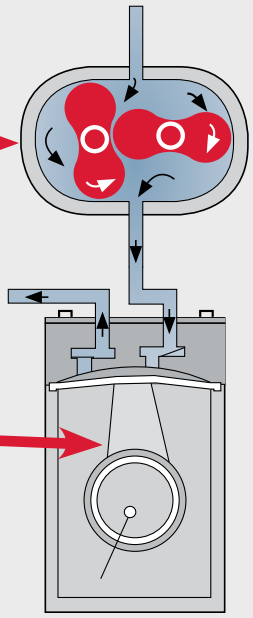
Foreline Catchpot Trap

320018-01

Catchpot trap mounts directly on inlet of pump via NW25 flange connection. Properly maintained trap prevents ingestion of liquid by pump. Liquid ingestion will cause pump to fail.

CAT. No	Description
320018-01	NW25 Connections

Principle of Operation

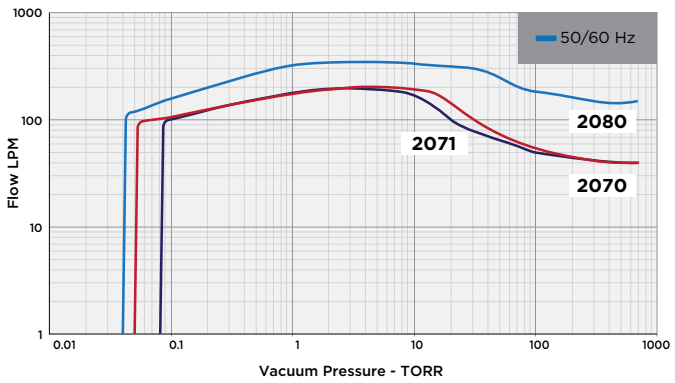


Vacuum roots blower is first pumping stage of CHEMSTAR DRY.

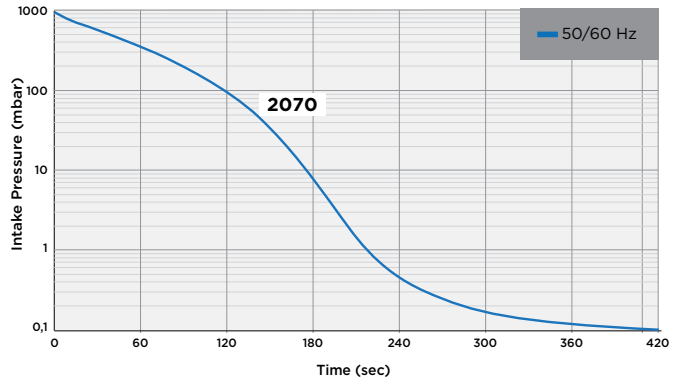
Two-stage PTFE diaphragm pump backs the vacuum roots blower to generate deep vacuum.

Patented control technology regulates blower rpm to match diaphragm pump flow rate creating plug & play operation. Controller technology senses sudden gas load or unintended leaks and slows blower rpm to protect system.

Speed Curves



Pumpdown Curve on 41 L tank



Foreline Cold Trap

1420H-14

Dry Ice/Liquid Nitrogen Cold trap is an effective device for protecting CHEMSTAR DRY from sticky substances and flash evaporative applications that can flood system with a high vapor load.
See page 69 for further details.

CAT. No	Description
1420H-14	Cold Trap, 1/2 in.(25 mm) O.D. Tube Stub., 1.5L Capacity
1420H-25	Cold Trap, NW25, 1.5L Capacity

For a Complete System

Component	page
• Traps	69
• Hose	67
• Gauges	77
• Vacuum Controller	75
• Service Kits	79

Oil Free Booster | Mini Vacuum Roots Blower

Model
2700

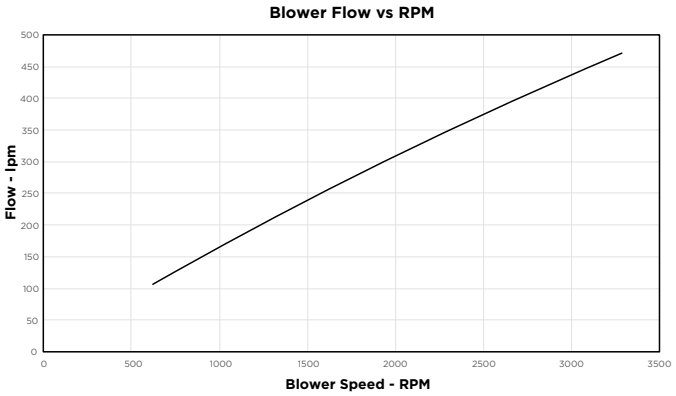
- **Oil-free pumping chamber**
- **Vacuum tight, corrosion resistant**
- **Compact**

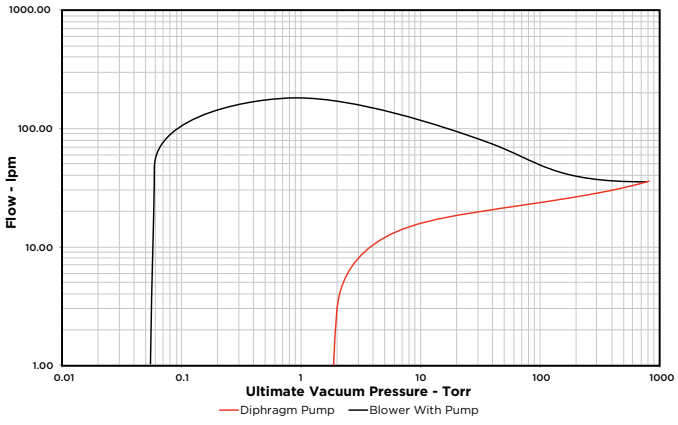
Welch's mini vacuum blower provides high gas flow in a compact size. The flow is accomplished with a set of synchronized impellers spinning in the pump housing. The impellers maintain tight clearances while spinning to enhance the efficiency of the pumping action. Use your existing DC power supply and vacuum control technology to control the variable speed drive mechanism.

The blower has two "modes" of operation: (1) backed by an oil sealed or an oil-free forepump to generate a vacuum pressure from 4 to 100 millitorr or (2) stand-alone blower to generate to generate vacuum pressure to 350 torr.

The benefit of mode (1) is that the blower acts as an added stage to a low flow forepump to improve ultimate vacuum pressure of forepump and also generates comparatively higher flows in the millitorr range compared to the forepump operating alone.

The benefit of mode (2) is the blower can provide high gas flow in a compact size. The flow through blower as a function of impeller rpm is shown





Specifications	
Model	**2700**
Max Free Air Displacement@1400 RPM, lpm	100[1]
Motor RPM at Max Free Free Air Displacement	1400
Ultimate Vacuum Pressure, torr(mbar) (No Backing Pump)	350 (467)
Ultimate Vacuum Pressure, torr (2-stage Rotary Vane Pump/1.5 torr Diaphragm Pump)	$1x10^{-3}/5x10^{-2}$
Operating Pressure Range, torr (mbar) (No Backing Pump)	350 to 760 (467 to 1000)
Motor Voltage, DC volts[2,3]	24
Inlet Thread, Female	¾-20
Outlet Thread, Female NPT	1/4
Duty Cycle	Continuous
Max Power Consumption, Watts	75
Max Amp Draw	4
Ordering Information	
24V Brushless DC	2700D-01

Note:
1. No cooling fan required at 1400 rpm
2. Brushless DC motor
3. User supplies control board

Application Note | Roots Blower

Oil Free Booster
Model 2700 oil-less mini vacuum roots blower pump is used to improve the pumping speeds of roughing pumps between 25 torr to 50 millitorr. The reason is that the pumping speed of roughing pumps, such as rotary vane pumps, diaphragm pumps, gear pumps, and scroll pumps, typically falls off in this pressure region. The blower may be used to pump solvent and corrosive vapors due the proprietary, chemically resistant coating on impellers and chamber. The blower is connected to the inlet of these roughing pumps.





Model 8890	Model 8905	Model 8917A-80	Model 8960	Models 8965/8970

Specifications			Special Application Systems		Chemvac		
Model	**8890**	**8905**	**Schlenk/ Rotovap**	**Freeze Dryer**	**8960**	**8965**	**8970**
Free Air Displacement							
cfm (l/min.) @60 Hz	1.1 (31)	1.8 (51)	1.1 (31)	6.1 (173)	6.6 (110)	13.2 (220)	25.2 (420)
m^3/hr (l/min.) @50 Hz	1.6 (26)	2.6 (43)	1.6 (26)	8.6 (144)	5.8 (97)	11.0 (183)	21.0 (350)
Ult. Vac. Pressure, torr(mbar)[1]	1 x 10^{-1} (0.133)	2x10^{-3} (2.7x10^{-3})	1x10^{-1} (0.133)	1x10^{-4} (1.3x10^{-4})	1.1x10^{-3} (1.5x10^{-3})	1.1x10^{-3} (1.5x10^{-3})	1.1x10^{-3} (1.5x10^{-3})
Sound Level, dBA	58	52	58	50	50	50	50
Motor/Pump Speed (60 Hz)	3450	3450	3450	1725	1740	1680	1680
Motor Horsepower (watts)	1/4 (190)	1/4 (190)	1/4 (190)	1/2 (370)	400 (.54 HP)	900 (1.21 HP)	900 (1.21 HP)
Oil Capacity, qt.(liters)	0.48 (0.45)	0.42 (0.4)	0.48 (0.45)	1.4 (1.3)	0.58 (0.55)	1.06 (1)	0.87 (0.82)
Tubing Needed, I.D. in.(mm)	3/8 (10)	7/16 (11)	3/8 (10)	7/16, 3/4 (11, 20)	0.75 (19)	0.75 (19)	0.75 (19)
Intake Connection(thread) [2]	1/4 in NPT	3/4-20	1/4 in NPT	1 1/8-20	NW 16	NW 25	NW 25
Exhaust Connection	3/4-20	3/4-20	3/4-20	1-20	25.5 kg	42.5 kg	46.0 kg
Exhaust Filter Included	Yes [6]	No	Oil Recycler	Yes	Yes	Yes	Yes
Weight, lbs.(kg)	24.5 (11.1)	24.5 (11.1)	27.5 (12.5)	55 (25)	56 (25.5)	94 (42.5)	101 (46)
Overall Dimensions LxWxH in.(cm)	14.5x5.1x8.4 (36.8x13x21.3)	14.5x5.1x8.4 (36.8x13x21.3)	14.5x5.1x14.3 (37x13x36)	18.6x11.5x9.6 (47x29x24)	19.7x13.0x13.4 (50x33x34)	23.2x13.6x16.5 (59x34.5x42)	23.2x13.6x16.5 (59x34.5x42)
Ship Weight, lbs.(kg)	33 (15)	33 (15)	37 (16.8)	70 (31.8)	100 (45.3)	116 (52.6)	124 (56.1)
Shipping Carton Dimensions LxWxH in.(cm)	21.5x12.5x16 (55x32x41)	21.5x12.5x16 (55x32x41)	21.5x12.5x16 (55x32x41)	25x18.5x14 (64x47x36)	65x41x48 (26x16x19)	65x41x48 (26x16x19)	65x41x48 (26x16x19)
Ordering Information							
Wired for 115V, 60Hz,1 Ph with N. American 115V Plug [3, 4]	8890A	8905A	8890A-70	8917A-80	8960A	---	---
Wired for 230V, 50Hz,1 Ph with Cont. Euro. (Schuko) Plug [3, 5]	8890C-02	8905C-02	8890C-72	8917C-80	---	---	---
Wired for 230V, 60Hz with N. American 230V Plug [3, 4]	---	---	---	---	8960C-01	8965C-01	8970C-01

Note:
1. Only Model 8890 should be operated continuously at pressure above 10 torr Ultimate Pressure measured with a trapped McCleod gauge.
2. Unibarb™ inlet barb connections accepts two sets of tubing ID
3. All single phase motors have overload protection.
4. 115V 60 Hz models are CSA approved.
5. 230V 50Hz models are provided w/CE mark.
6. Cat. No. 1416B Exhaust Oil Recycler is recommended when operating GEM Model 889-0 at pressure of 1 torr or higher.

GEM Vacuum System

The GEM® model 8890A-70 vacuum system is ideal for rotary evaporations with very high boiling point solvents and schlenk lines/vacuum manifolds.

The rugged gear pumping mechanism has a wide range of operating pressures and passes vapors readily without the pump mechanism damage often seen in rotary vane pumps. The GEM® efficiently pumps vapors without condensing them into the pump. Provides vacuum to 0.1 torr with free air displacement of 31 l/min.

The complete system comes with a gauge, vacuum regulator for easy vacuum control and an exhaust mist eliminator for recycling oil back into the pump. Ventilation to a hood is recommended.

Model 8890A-70

For a Complete System

Component	page
• Traps	69
• Exhaust Accessories	70
• Fittings / Hose	66 - 67
• Gauges	77
• Vacuum Controller	75
• Service Kit	79, 82
• Oil	72 - 73

CRVpro

Your Robust Vacuum Pump

Discover the evolution of two-stage rotary vane vacuum pumps. Built to last. Born to perform. And designed to simplify your work. Meet the robust vacuum pump series – CRVpro.

COOL RUNNING

Enhanced air flow allows the pump to run 10°C cooler than standard rotary vane pumps. The lower temperature leads to reduced chemical activity within the pump and slows down rates of oil consumption.

INTERNAL SURFACE PROTECTION

Inside surface of the oil case has a PTFE coating and the outer surface of the pumping module has a black oxide coating. Both coatings act to slow metal corrosion and, when coupled with foreline traps, extend service interval.

LARGE OIL CAPACITY

Chemical vapors that sublime from the foreline cold trap into the pump oil are more diluted due to the larger oil capacity. This minimizes the rates of oil breakdown and reduce chemical attacks within the pump.

HIGHEST RELIABILITY | **LONG PRODUCT LIFESPAN** | **LESS MAINTENANCE**

EXTENDS SERVICE INTERVAL

Applications

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Also commonly used in OEM instrumentation and high vacuum backing pump applications

Standard Features of CRVpro

1. Low Noise Level
2. Forced Oil Lubrication
3. Anti-Suck Back Valve
4. Gas Ballast
5. cUL & CE Certification
6. Sized To Fit Your Application
7. Dual Voltage Motor On CRVpro 4,6,8

Model CRVpro 4	Model CRVpro 6	Model CRVpro 8	Model CRVpro 16	Model CRVpro 24	Model CRVpro 30

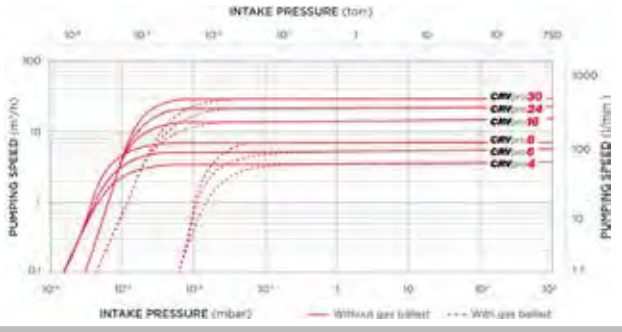
Specifications

Model	CRVpro 4	CRVpro 6	CRVpro 8	CRVpro 16	CRVpro 24	CRVpro 30
Free Air Displacement						
CFM(l/min)@60Hz	2.8(78)	4.2(118)	5.6 (158)	12.8 (363)	18.3 (519)	22.1 (627)
m^3/hr (lpm)@50Hz	4 (67)	6 (100)	8 (133)	18.3 (305)	26.2 (436)	33.1 (551)
Ult. Vacuum Pressure Total, torr (mbar)	$1.5x10^{-3}$ ($2x10^{-3}$)	$1.5x10^{-3}$ ($2x10^{-3}$)	$1.5x10^{-3}$ ($2x10^{-3}$)	$3x10^{-3}$ ($2x10^{-3}$)	$3x10^{-3}$ ($2x10^{-3}$)	$3x10^{-3}$ ($2x10^{-3}$)
Sound Level, dBA@50Hz	50	50	50	55	55	55
Motor/Pump Speed (50/60Hz)	1450/1725	1450/1725	1450/1725	1450/1725	1450/1725	1450/1725
Motor Horsepower, kW (50/60Hz)	0.37/0.4	0.37/0.4	0.37/0.4	0.75	1.1	1.1
Oil Capacity, qt.(liters)	1.22(1.15)	1.22(1.15)	1.06(1.00)	2.55(2.41)	2.10(2.00)	2.10(2.00)
Intake/Exhaust Flange	NW16	NW16	NW16	NW25	NW25	NW25
Tubing Needed, I.D. in. (mm)	5/8-3/4(16-19)	5/8-3/4(16-19)	5/8-3/4(16-19)	13/16(21)	13/16(21)	13/16(21)
Weight, lbs.(kg)	49.7(22.6)	50.2(22.8)	51.7(23.5)	81.4(37)	84.7(38.5)	86.9(39.5)
Overall Dimensions LxWxH in.(cm)	18.2x6.1x9.1 (46x16x23)	18.2x6.1x9.1 (46x16x23)	18.2x6.1x9.1 (46x16x23)	22.4x8.1x11.4 (57x21x29)	22.4x8.1x11.4 (57x21x29)	22.4x8.1x11.4 (57x21x29)
Shipping Carton Weight, lbs. (kg)	59.8(27.2)	60.3(27.4)	61.8(28.1)	94.8(43.1)	96.8(44)	99(45)
Shipping Carton Dimensions LxWxH in. (cm)	22.8x13x12.8 (58x33x33)	22.8x13x12.8 (58x33x33)	22.8x13x12.8 (58x33x33)	26.9x15.1x15.3 (68x38x39)	26.9x15.1x15.3 (68x38x39)	26.9x15.1x15.3 (68x38x39)
Ordering Information						
Wired for 115V, 60Hz, 1Ph with N. Amer. 115V plug[1]	3041-01	3061-01	3081-01	3161-01	3241-01	3301-01
Wired for 230V, 50/60Hz, 1Ph with Schuko, UK and male/female IEC plugs[1]	3042-01	3062-01	3082-01	3162-01	3242-01	3302-01

Note: 1. CRVpro 4, 6, 8 includes qty one hose barb adapter(NW16 to 5/8-3/4 in.), qty one NW16 to NW25 adapter, qty two NW16 centering rings and qty two NW 16 hinge clamps. CRVpro 16, 24, 30 includes is qty one hose barb adapter(NW25 5/8 to 3/4 in.), qty two NW25 centering rings and qty two NW 25 hinge clamps.

Note: 2. See page 25 for HVAC duty pumps including CRVpro

Pumping Speed Curves
CRVpro pumps are known for their high efficiency pumping into the low millitorr range. Their characteristic flat speed curves illustrates the high efficiency pump. The tight part tolerances and cooler operating temperatures generate less blowback during pumpdown.



For a Complete System

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Rugged Belt Drive Vacuum Pumps | DuoSeal®

Model 1400

Models 1405 / 1402

Model 1376

Models 1397 / 1374

CE

Specifications	Two-Stage Vacuum Pumps					
Model	**1400**	**1405**	**1402**	**1376**	**1397**	**1374**
Free Air Displacement						
cfm	0.9	3.2	5.6	10.6	17.7	23
l/min.	25	90	160	300	500	650
Ult. Vac. Pressure, torr (mbar) [1,2]	1×10^{-4} (0.00013)	1×10^{-4} (0.00013)	1×10^{-4} (0.00013)	1×10^{-4} (0.00013)	1×10^{-4} (0.00013)	1×10^{-4} (0.00013)
Gas Ballast	Yes	Yes	Yes	Yes	Yes	Yes
Discharge Pressure (PSIG)	---	---	---	---	---	---
Pump RPM	580	525	525	525	400	510
Motor Horsepower (watts)	1/3 (250)	1/2 (370)	1/2 (370)	1 (750)	1 (750)	1-1/2 (1120)
Oil Capacity, qt.(liters)	0.62 (0.59)	2.25 (2.1)	2.25 (2.1)	2.5 (2.4)	1.25 (1.2)	1.25 (1.2)
Tubing Needed, I.D. in.	7/16 (11)	7/16 (11)	13/16 (21)	13/16 (21)	1-5/8 (41)	1-5/8 (41)
Intake, Nipple Thread	3/4-20	1-20	1-20	1-20	1.75-20	1.75-20
Exhaust, Thread Type	3/4-20	1-20	1-20	1-20	1.75-20	1.75-20
Weight, lbs. (kg)	58 (26)	112 (51)	112 (51)	156 (71)	205 (93)	220 (100)
Overall Dimensions LxWxH in.(cm)	17.8x9x12.6 (45.1x32.1x31.8)	20x12x15 (51x30.5x60)	20x12x15 (51x30.5x60)	20x14.1x15.4 (51x35.9x39)	26x13.7x18.8 (66x34.8x47.6)	26x13.7x18.8 (66x34.86x47.6)
Ship Weight, lbs. (kg)	70 (31.8)	132 (60)	132 (60)	180 (81.8)	213 (96.8)	215 (97.7)
Shipping Carton Dimensions LxWxH in.(cm)	20.5x13.8x14.5 (52.1x35.1x36.8)	22.5x15.5x19.5 (57.2x39.4x49.5)	22.5x15.5x19.5 (57.2x39.4x49.5)	22x18x19 (55.9x45.7x48.3)	27.3x18x22 (69.3x45.7x55.9)	27.3x18x22 (69.3x45.7x55.9)
Ordering Information [3,4]						
Wired for 115V, 60Hz, 1 Ph with N. American 115V Plug	1400B-01	1405B-01	1402B-01	1376B-01	1397B-01	1374B-01[5]
Wired for 230V, 60Hz, 1 Ph with N. American 230V Plug	1400C-01	1405C-01	1402C-01	---	---	---
Wired for 220V, 50Hz, 1 Ph w/Cont. Euro. (Schuko) Plug	1400C-02	1405C-02	1402C-02	1376C-03	1397C-03	---
Explosion Proof Motor, 115V, 60 Hz	1400W-01	1405W-01	1402W-01	---	---	---
3-Phase Motor 230V, 460V, 60Hz	---	---	1402M-01	1376M-01	1397M-01	1374M-01
Wired for 115V, 60Hz, 1 Ph with N. American 115V Plug, CSA	1400B-80	1405B-80	1402B-80	---	1397B-80	---

Applications

DuoSeal Pumps

Rugged oil-seal pumps for a wide variety of vacuum needs, including Schlenk drying lines, freeze drying, degassing, concentrations, distillations, and more. Pulley drive enables low pump rpm operation – reduces friction, oil temperature, and oil degradation. Large oil reservoir minimizes contamination effects and extends maintenance intervals. Use of a cold trap is recommended to protect the pump and enhance vacuum levels.

Refrigeration Servicing Pumps

Special Welch DuoSeal pumps are fitted with components designed to withstand refrigerant contact. Models 1402B-46 and 1397B-46 include integrated handles.

Notes:
1. Two-stage pumps should not be operated continuously at pressures above 10 torr. Ultimate pressure measured with a trapped McCleod gauge.
2. One-stage pumps should not be operated continuously at pressures above 50 torr.

Model 1399N

Model 1402B-46

Model 1376B-46

Model CRR-1A

One-Stage Vacuum Pumps w/o plate	One-Stage Vacuum Pumps w/bell jar plate	Refrigeration Servicing Pumps w/o plate	Refrigeration Servicing Pumps			CAPTURE Refrigerant Recovery
1399	**1399N**	**1380**	**1402B-46**	**1376B-46**	**1397B-46**	**CRR-1A**
1.2	1.2	5.6	5.6	10.6	17.7	10.6
35	35	160	160	300	500	300
1.5 x 10^{-2} (0.019)	1.5 x 10^{-2} (0.019)	1.5 x 10^{-2} (0.019)	1 x 10^{-4} (0.00013)	1 x 10^{-4} (0.00013)	1 x 10^{-4} (0.00013)	3x10^{-2} (0.04)
No	No	Yes	Yes	Yes	Yes	---
---	---	---	---	---	---	30
750	750	535	525	525	400	525
1/3 (250)	1/3 (250)	1/2 (370)	1/2 (370)	1 (750)	1 (750)	1 (750)
0.5 (0.47)	0.5 (0.47)	3.7(3.5)	2.25 (2.1)	2.5 (2.4)	1.25 (1.2)	2.5 (2.4)
7/16 (11)	7/16 (11)	13/16 (21)	3/4" ID Flare	3/4" ID Flare	Note 7	----
3/4-20	3/4-20	1-20	1-20	1-20	1.75-20	1 NPT
3/4-20	3/4-20	1-20	1-20	1-20	1.75-20	1 NPT
51 (23)	63 (28.6)	91(41)	112 (51)	156 (71)	205 (93)	122 (55.4)
17x9x10 (43.x23x25)	17x9x10 (43.x23x25.)	20x12x15 (51x31X38)	20x12x15 (51x30.5x60)	20x14.1x15.4 (51x35.9x39)	26x13.7x18.8 (66x34.8x47.6)	19.25x12.3x11.1 (48.9x31.3x28.1)
62 (28.2)	74 (33.6)	116 (53)	132 (60)	180 (81.8)	213 (96.8)	136 (61.8)
21x14x15 (52x35x37)	21x14x15 (52x35x37)	23x15x18 (56x38x47)	23x16x20 (57x39x50)	22x18x19 (56x46x48)	28x18x22 (69x46x56)	22x15x18 (56x38x46)
1399B-01	1399N-01	1380B-01	1402B-46	1376B-46	1397B-46	CRR-1A
---	---	---	---	---	---	----
1399C-02	---	---	1402C-46	1376C-46	1397C-46	CRR-1B
---	---	---	---	---	---	----
---	---	---	---	---	---	----
---	1399B-80	---	---	---	---	---

3. All 115V and 230V single phase motors include thermal overload protection.
4. Models 1400C-02, 1405C-02 and 1402C-02 provided with CE marking.
5. Conduit wiring installation required. No cord, plug or switch provided.
6. CSA approved models are 1400B-80, 1405B-80 and 1402B-80.
7. 1-1/2" NPT Female

DuoSeal™ Vacuum Pump Oil

Tested to high vacuum levels, this oil meets rigid requirements for vapor pressure, stability and viscosity.

Size	CAT. No.
Quart	1407K-11
Gallon	1407K-15
5 Gallon	1407K-20

Exhaust Filter

A replaceable filter element captures oil mist from the exhaust port of the pump and reduces pump noise.

Pump	CAT. No.
1399, 1400	1417
1376, 1402, 1405	1417P-10
1397, 1374	1417P-20

For a Complete System

Apply deep vacuum to your system in the toughest conditions. ChemStar® pumps are built to withstand corrosive chemical vapor environments - durable performance over the long haul. ChemStar® is designed to minimize the effects of harmful chemicals:

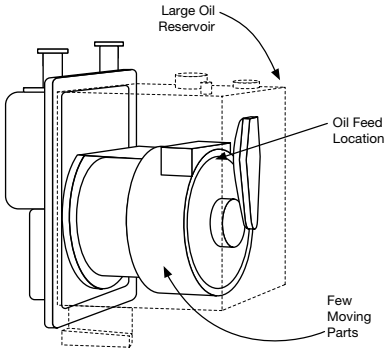
Rugged Rotary Vane Design
Built to the renowned performance standards of Welch DuoSeal® pumps, ChemStar® utilizes vapor contact components that are tough and chemical resistant. The belt-drive mechanism gears the pump down, enabling slow pump operation to reduce friction and keep operating temperatures low.

Lubrication System
The oil capacity is large for excellent dilution of contaminants. Oil is fed to the pump from the top of the reservoir, allowing sludge to settle without compromising lubrication. The recommended lubricant ("Gold Oil") is a synthetic oil designed to reduce chemically active sites. Use the nitrogen purge to drive elimination of corrosive gases.

Key Accessories
Welch also provides the system add-ons that further protect your pump and your environment. Select the equipment that augments your vacuum system needs – traps, oil mist eliminators, and system components.

The Five Defining Features Needed For Pumping Corrosive Gases

1. **High Contamination Tolerance**
   - Contaminants diluted
   - Fewer moving parts
   - Top oil feed for cleaner oil



2. **Vital Parts Corrosion Resistant**
   - Fluoroelastomer seals and gaskets
   - PTFE
   - Stainless Steel
   - Nickel Plated or Anodized
   - Chemical Resistant Grade of Cast Iron
3. **Reduced Frictional Wear**
   - Less than 580 RPM vs. typical 1750 RPM direct drive
4. **Nitrogen Purge Standard**
   - Degasses and cools oil
5. **Easy Attachment of Accessories**
   - Complete accessory package for corrosive gases

- HCl
- O_3
- H_2SO_4
- HBr
- HOAc
- SO_x
- Br_2
- F_3CCO_2H
- H_2S
- Cl_2
- CH_2O
- HNO_3
- SF_6, CF_4 fragments and other gases

Model 1402N

Specifications & Ordering - See Below

Specifications

Model	1400N	1402N	1376N
Free Air Displacement			
cfm (l/min.)@60 Hz	0.9	5.6	10.6
m^3/hr (l/min.)@50 Hz	25	160	300
Ultimate Pressure, torr(mbar)[1]	1 x10^{-4} (0.00013)	1 x 10^{-4} (0.00013)	1 x 10^{-4} (0.00013)
Gas Ballast	Yes	Yes	Yes
Pump RPM	580	525	525
Motor Horsepower (watts)	1/3 (250)	1/2 (370)	1 (750)
Oil Capacity, qt.(liters)	0.62 (0.59)	2.25 (2.1)	2.5 (2.37)
Tubing Needed, I.D. in.	7/16 (11)	13/16 (21)	13/16 (21)
ISO Exhaust & Intake Flange [5]	NW 16	NW 25	NW 25
Overall Dimensions LxWxH in.(cm)	17.8x9x12.6 (45.2x22.9x32)	19.3x14.1x15.4 (49x35.3x39.1)	19.3x12.3x15.6 (49x31.2x39.6)
Weight, lbs.(kg)	58(26)	112(51)	156(71)
Ship Weight, lbs.(kg)	71(32.3)	133(60.5)	181(82.3)
Shipping Carton Dimensions LxWxH in.(cm)	20.5x13.8x14.5 (52.1x35.1x36.8)	22.5x15.5x19.5 (57.2x39.4x49.5)	22x18x19 (59.5x45x48)
Ordering Information [2, 4]			
Wired for 115V, 60Hz, 1 Ph w/N. American 115V Plug	1400N-01	1402N-01	1376N-01
Explosion Proof Motor 115V, 60Hz, 1 Ph	1400N-90[3]	1402N-90[3]	---
Wired for 230V, 60Hz, 1 Ph w/ N. American Plug	---	1402N-60	1376N-60
Wired for 220V, 50Hz, 1 Ph w/ Cont. Euro. (Schuko) Plug	1400N-50[6]	1402N-50[6]	1376N-49
Wired for 100V, 50/60Hz, 1 Ph for Japan	1400N-53	1402N-53	1376N-53

Notes:
1. ChemStar pump should not be operated continuously at pressures above 10 torr. Ultimate pressure measured with a trapped McCleod gauge.
2. All single phase motors have overload protection.
3. Conduit wiring installation required. No cord, plug or switch provided.
4. Hinged clamp, centering ring assembly and hose adapter are included with all ChemStar Pumps.
5. Standard filter option possible if the exhaust flange is removed, but not chemically resistant.
6. Units supplied with CE marking.

Model
CRR-1A

- **Continuous discharge pressure to 30 psig(2.1 Bar)**
- **Pump shell rated to 100 psig (2.1 Bar)**
- **Minimal loss of pumping efficiency below 29.9" Hg (1000 microns/1.3 mbar)**
- **High flow rate of 10.6 cfm(300 lpm)**
- **Durable cast iron construction**
- **Proven dependability**

The CAPTURE pump has been specifically designed for refrigerant recovery and recycling systems requiring chiller evacuation to 29.9 in. Hg(1000 micron/1.3 mbar) while subsequent boosting of refrigerant vapor to a holding tank to 30 psig(2.1 Bar). CAPTURE pumps are the heart of transportable recovery systems used for recovering low and medium pressure refrigerants, such as R-123 and R-11.

Recovery with the CAPTURE pump can be configured in a recovery system to employ the liquid-vapor method. The first step is the recovery cylinder is evacuated with the CAPTURE pump and that pulls the refrigerant from chiller into the cylinder. Once the liquid refrigerant is recovered, valves are switched on the recovery system, so that the remaining vapor in chiller is evacuated by the pump and boosted into chiller. The CAPTURE pump then reaches vacuum pressure levels in chiller that are required by the Clean Air Act.

Pump oil separation from refrigerant vapor and return to pump is accomplished by attaching a standard float actuated oil return found in refrigerators. The oil separator is a proven technology that minimizes pump oil loss even for very large refrigerant systems. DUOSEAL pump oil, CAT no. 1407K-11, is recommended lubricant to operate the CAPTURE pump.

Specifications	
Model	**CRR-1**
Free Air Displacement	
cfm(lpm)	10.6 (300)
Ult. Vac. Pressure, torr (mbar)	$3x10^{-2}$ (0.04)
Max Vacuum, in Hg	29.9+
Discharge Pressure, psig(bar)	30 (2.1)
Pump RPM	525
Motor Horsepower (watts)	1(750)
Oil Capacity, qt. (liters)	2.5(2.4)
Intake thread, NPT in.	1
Exhaust thread, NPT in.	1
Weight, lbs (kg)	112(55.5)
Overall dimensions LxWxH in.(cm)	19.3x12.3x11.1 (49x31.2x28.2)
Ship Weight, lbs. (kg)	170((77.3)
Shipping Carton Dimensions LxWxH in. (cm)	20x14.1x15.4 (55.9x45.7x48.3)
Ordering Information	
Wired for 115V, 60Hz, 1 Ph with N. American 115V plug	CRR-1A
Wired for 230V, 50Hz, 1 Ph w/Cont. Euro. (Schuko) plug	CRR-1B
Mounted pump on base with guard, but without motor	CRR-1C

Diffusion Pump Systems | DP

Model
DP

- **High pumping speed**
- **Quick attainment of ultimate vacuum pressure**
- **Air-cooled and water cooled diffusion pump options**
- **Manual and electro-pneumatic options for opening high vacuum valve**

DP oil diffusion pump systems are used to economically generate high vacuum to $1x10^{-6}$ mbar ($7.5 x10^{-7}$ torr). The system consists of an oil diffusion pump backed by oil sealed rotary vane pump, MRV100 high vacuum gauge, high vacuum valve, backing valve, connecting tubing, charge of silicone oil for diffusion pump, charge of oil for the backing pump, and cables/plugs. All components are mounted on a trolley with wheels. Both air cooling and water cooled diffusion pump systems are available.

The backing valve is part of the by-pass line to allow initial evacuation of vacuum chamber without air from chamber passing through the diffusion pump. The high vacuum valve is located at the inlet of the diffusion pump and must be opened slowly to prevent the pressure in the exhaust of the oil diffusion pump from rising too quickly.

Two options of high vacuum valve are available – manual and electro-pneumatic – in DP systems. The high vacuum gauge tube from the MRV100 high vacuum gauge monitors the pressure at the inlet of the diffusion pump. With a electro-pneumatic backing valve system, the MRV100 vacuum gauge sends a signal to the electro-pneumatic valve to slowly open when set pressure is reached. Manual high vacuum valve type systems require operator to open up slowly the high vacuum valve.

The oil diffusion pump has no moving parts. Within the diffusion pump is a stationary multi-stage jet assembly. Hot oil vapor passing thru the jet assembly creates the pumping action. When the oil is boiled below the multi-jet assembly, a stream of silicone oil molecules is ejected thru these jets at supersonic speeds. Gas molecules are hit by this supersonic jet stream. The oil jet with gas molecules hits the outer cooled shell of the oil diffusion pump. The oil is condensed and falls down to the boiler carrying with it the gas molecules. The rotary vane pump removes these compressed gas molecules at the exhaust port of the diffusion pump. This cyclic process creates the pumping action of an oil diffusion pump.

Specifications					
Model	**DP 25L/4DM**	**DP 63/4DM**	**DP 100/8DM**	**DP 63/4DP**	**DP 100/8DP**
Backing pump displacement	DN 40 KF	DN 40 CF	DN 63 ISO-K	DN 63 CF	DN 63 ISO-K
m3/hr(l/min.) @50Hz	4.6(77)	4.6(77)	7.2(120)	4.6(77)	7.2(120)
cfm(l/min.) @60Hz	3.2(92)	3.2(92)	5.1(143)	3.2(92)	5.1(143)
Pumping speed for air, l/s	15	110	210	110	210
Ultimate pressure, mbar	$1x10^{-6}$	$1x10^{-6}$	$1x10^{-6}$	$1x10^{-6}$	$1x10^{-6}$
Inlet connection flange	DN 25 KF	DN 63 ISO-K	DN 100 ISO-K	DN 63 ISO-K	DN 100 ISO-K
Cooling method	Air	Water	Water	Water	Water
Cooling water consumption, l/min	N/A	0.7	1.0	0.7	1.0
Oil filling (oil diffusion pump), ml	30	55	100	55	100
Valve type	Manual	Manual	Manual	Electro-pneumatic	Electro-pneumatic
Power, W	650	800	1000	800	1000
Dimensions, in.(cm)	19.7x18.9x31.3 (50x48x80)	19.7x18.9x27.3 (50x48x69)	19.7x18.9x27.3 (50x48x69)	19.7x18.9x27.3 (50x48x69)	19.7x18.9x27.3 (50x48x69)
Weight, lbs.(kg)	55(25)	63.8(29)	81.4(37)	68(30)	89.1(40.5)
Ordering information					
230V, 50Hz	100221	100326	100327	100328	100329
115V, 50/60Hz	100221-01	100326-01	100327-01	--	--

Note: Replacement silicone XT704 oil used in diffusion pump, CAT. No. 800106 (0.5 liter).

Model CDK

Model STP

- **Oil-free vacuum**
- **Vacuum to 5 x 10^{-8} mbar**
- **User friendly**
- **Automatic shut-off device for the backing pump**
- **Lightweight, compact and portable**

CDK and STP turbomolecular pumping systems are completely oil-free. Both systems incorporate an oil-free SST turbomolecular pump using dry-running, solid-lubricated ceramic bearings. The backing pump is an oil-free diaphragm vacuum pump.

Both turbomolecular pumping systems have a unique, built-in automatic shut-off device for the backing pump. The backing pump is switched off as soon as the ultimate vacuum pressure is reached in the chamber. The solenoid valve in the fore-line piping to the turbomolecular pump is closed simultaneously to prevent back venting of the turbomolecular pump and the connected vacuum system. If there is a renewed gas load at the inlet port of the turbomolecular pump, that is the pressure rises, then the backing pump is first switched on and then the solenoid valve opened.

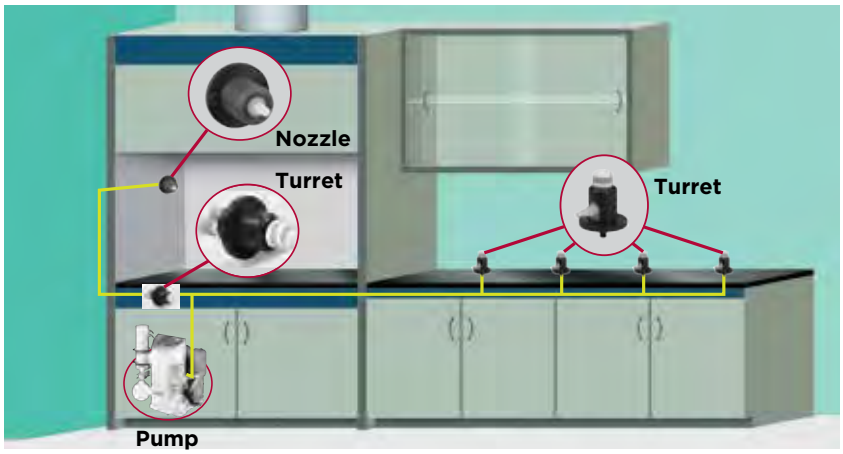
If the pump system works continually at the ultimate pressure, and if the connected vacuum system has a low real and virtual leak rate (wall degassing), then it is possible that the backing pump will remain switched off for hours.

The CDK systems have all components housed inside a casing, making them very compact and portable. The components include turbomolecular pump, backing pump, controller, and connecting tubing. A simple On/Off button makes operation simple. CDK systems employ a Model MPC104Tp three-stage chemical duty diaphragm pump as the backing pump.

The STP systems consist of a turbomolecular vacuum pump, backing pump, controller, connecting tubing and vacuum gauge. All components are mounted on a mobile base plate to which the profile pillar is attached. The vacuum chamber may be mounted either directly to the suction port of the turbomolecular pump or the turbomolecular pump can be removed from its holder on the profile pillar and connected to the chamber are larger and mounted on a mobile trolley for smooth relocation between applications. A three-stage Model MP601T diaphragm pump is the backing pump.

Specifications						
Model	**CDK 240**	**CDK 240 UHV**	**CDK 263**	**CDK 263 UHV**	**STP D1.1**	**STP D5.1**
Inlet connection flange	DN 40 KF	DN 40 CF	DN 63 ISO-K	DN 63 CF	DN 63 ISO-K	DN 100 ISO-K
Pumping Speed, l/s (N2)	49	56	67	67	67	250
Pumping Speed, l/s (He)	38	46	63	63	63	255
Pumping Speed, l/s (H2)	36	40	53	53	53	220
Ultimate pressure, mbar	$5x10^{-7}$	$5x10^{-8}$	$5x10^{-7}$	$5x10^{-8}$	$5x10^{-7}$	$5x10^{-7}$
Backing pump FAD, lpm (50/60Hz)	13 / 15	13 / 15	13 / 15	13 / 15	75 / 81	75 / 81
Dimensions, LxWxH, in. (cm)	8x13x16 (19x34x40)	8x13x16 (19x34x40)	8x13x16 (19x34x40)	8x13x16 (19x34x40)	19x20x28 (48x50x70)	19x20x28 (48x50x70)
Weight, lbs.(kg) 230V 115V	30(13.7) 32(14.4)	32(14.7) 34(15.4)	30(13.7) 32(14.4)	32(14.7) 34(15.4)	44(20)	55(25)
Ordering Information						
230V, 50/60Hz	101250	101251	101252	101253	101353	101354
115V, 50/60Hz	101250-01	101251-01	101252-01	101253-01	--	--

WelchNet™ | Modular Lab Vacuum Network



- **Quick & simple to install a modular lab vacuum network**
- **Resistant to chemical attack**
- **Provides stable vacuum**
- **Expands easily as needs change**

WelchNet provides built-in vacuum to benches and fume hoods. A WelchNet modular lab vacuum network consists of an oil-free pump, turrets, compression fittings and tubing and is economical & easy to install. The turrets are mounted on furniture, hoods or walls and are connected to the oil-free vacuum pump via tubing and compression fittings.

The modular network can be modified to tailor to a researcher's latest lab work and material flow needs. WelchNet can be installed within furniture during renovation of a lab, building a new lab facility, or added on to an existing laboratory. WelchNet has become a powerful new alternative to central vacuum for lab managers, architects and researchers.

WelchNet consists of three distinct vacuum source options depending on your needs and budget

Type I - Switch On/Off - Pump
A a cost effective pump option for a basic WelchNet vacuum system is either a chemical duty PTFE diaphragm vacuum pump or a standard duty WOB-L® vacuum pump. A catchpot in-line is always recomended. The pump chosen will depend on your application.

Using standard turrets, initial WelchNet costs are typically 30-50% lower than a contractor installed central vacuum system.

Type II - On-Demand - Pump System
WelchNet On-Demand LVS diaphragm pump system provide the perfect vacuum for multiple laboratory turrets.

The On-Demand Vacuum System only activates the pump when vacuum pressure is required. The system can be adjusted to vacuum level set point within control band to trigger pump activation.

Type III - Mobile Pump Bank
WelchNet Titan is a microprocessor controlled system of high capacity PTFE diaphragm vacuum pumps. The pumps work individually or in tandem holding vacuum level even if an individual pump needs maintenance.

One or more pumps in a Titan come on in response to vacuum demand, rotating usage to distribute pump wear and extend maintenance interval.

The Advantages of WelchNet Modular Vacuum Network to a Central/House Vacuum System

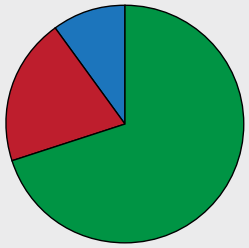
WelchNet Modular Network Vacuum	Central/House Vacuum
1. Flexible modular design is easily adapted as needs change	1. Commonly located in basement
2. Oil-free vacuum pump is an environmentally friendly solution	2. Pumps periodically need fluid change and disposal of hazardous fluid
3. Chemically resistant WelchNet turrets	3 Standard turret left open will lead to unstable vacuum for other users
4. Low capital outlay	4. Typically 50% more expense to purchase and install
5. Control cross-contamination between labs	5. Waste vapors spreading thru whole building plumbing
6. On-demand usage saves energy and money	6. Always-on wastes energy

4 Steps to Properly Size A Modular Vacuum Network[2]

Step 1

Identify the applications that you use built in vacuum in your laboratory.

From Welch's experience, the common applications using built-in vacuum sources are as follows:



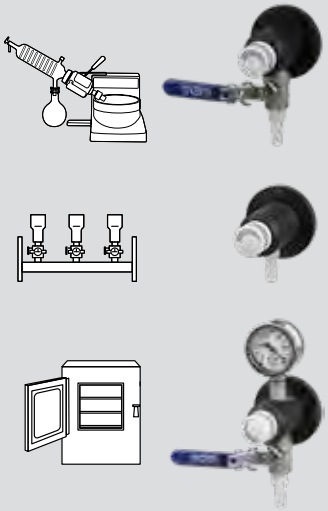
10% Rotary Evaporator

70% Filtration

20% Vacuum Oven, Aspiration, Desiccator

Step 2

Determine the number of turrets that you will need in your laboratory that properly supports the number of users and applications.



Step 3

Review the common rules of thumb for determining distance between applications and vacuum source using 8 mm ID PTFE tubing.

Rule of Thumb 1: For aspiration and filtration, the maximum distance recommended between farthest turret and the vacuum pump is 66 ft(20 m).

Rule of Thumb 2: If the vacuum level at application needs to below 10 torr(29.5 in Hg), the maximum distance from pump to the turret is 33 ft(10 m).

Rule of Thumb 3: The maximum distance from Mini-Vacuum Network to the vacuum pump is 33 ft(10 m).

Rule of Thumb 4: The maximum linear feet of 0.5 in. ID(13 mm) pvc or copper tubing is 200 ft(61 m); a flow rate factor of 1 lpm per 1 linear ft. of tubing is recommended.

Step 4

Select the type of turret that best suits your lab needs and budget.

Standard Lab Turret
- Plated Metal
- Non Regulated
- On/Off

VS

WelchNet Turret
- Chemically Resistant
- Fine Vacuum Regulation
- On/Off
- Check Valve to Prevent Cross Contamination

Note 2: Please contact your local representative for assistance in specifying a WelchNet system for your lab.

Model Selector | WelchNet

Application	Vacuum Pump Model		Type	Ultimate Vacuum Pressure of Application	Number of Turrets				
	Standard Duty Applications	Chemical Duty Applications			3 Turret Mini-Network	5 Turrets	8-10 Turrets[1]	20 Turrets[1]	30 Turrets[1]
Aspiration & Filtration	2546B-01 45 lpm	2037B-01 50 lpm	Type I	27.6 in. Hg (<60 torr)	✔	✔			
	2567B-50 100 lpm	2047B-01 70lpm	Type I				✔		
	2585B-50 201 lpm	2067B-01 221 lpm	Type I					✔	
	---	LVS 2410 E ef 283 lpm	Type II					✔	
	---	2634C-01 640 lpm	Type III						✔
Vacuum Oven, 0.6 ft³	2561B-50 66 lpm	2042B-01 35 lpm	Type I	29.5 in. Hg (<10 torr)	✔				
		2052B-01 65lpm	Type I			✔			
		LVS 310 Z en 41 lpm	Type II		✔				

Note 1: Assumes 50% of the turrets used at one time.

Application Note | Care and Feeding of Pump

WelchNet Pump
- In-house repair easily done in less than an hour
- Maintenance kits readily available, usually stocked by repair dept.
- Spare pump typically available to eliminate down-time
- Typically greater than one year maintenance interval

Central/House Vacuum Pump
- Periodically need to change oil and dispose of hazardous waste oil
- Repairs may take weeks on large pumps
- Difficult to access repair area
- Typically quarterly maintenance interval

Flush Mount

Surface Mount

- **Quick & easy to install**
- **Easily controls flow rate**
- **Chemically resistant**
- **Built-in check valve for stable vacuum**
- **Two mount options**

WelchNet turrets are designed for easy installation. A flush mount turret hides the vacuum tubing in the wall, bench or hood. A surface mount turret is commonly used when tubing cannot be installed behind a wall.

Vacuum provided by a WelchNet modular vacuum network is inherently more stable than a central vacuum system using standard lab turrets. The reason is the check valve within each WelchNet turret. The benefit of the check valve is it minimizes the risk of interference/cross contamination between applications when turrets are opened and closed.

All wetted surfaces of WelchNet turrets are made of chemically resistant materials. The turret body is black polypropylene. The check valve in the turret is made of perfluoroelastomer (FFKM) and the wetted flow regulator is made of polyvinylidene difluoride (PVDF).

Manual Vacuum Regulation Turret Flush Mount

700562/700562-01

- Open/close the vacuum line and easily control flow rate

Turret has stepped hose barb that accepts 1/4 - 3/8 in. vacuum hose(DN8-10). Dimensions: 6.9 cm(2.7 in.) diameter, 8.2 cm(3.2 in.) protrusion from wall and 2 cm(0.8 in) into wall.

Use With	Connection Type For 10 mm OD PTFE Tubing	CAT. No.
Wood Furniture	PVDF compression fitting(not included)	700562
Sheet Metal Furniture	PVDF adapter, compression fitting to G3/8 male thread (not included)	700562-01

Manual Vacuum Regulation Turret Surface Mount

700532-15

- Open/close the vacuum line and easily control flow rate

Turret has stepped hose barb that accepts 1/4 - 3/8 in. vacuum hose(DN8-10). Dimensions: 6.9 cm(2.7 in.) diameter, 8.2 cm(3.2 in.) protrusion from wall and 2 cm(0.8 in) into wall.

Use With	Connection Type For 10 mm OD PTFE Tubing	CAT. No.
Wall and Wood Furniture	PVDF compression fitting(included in turret assembly)	700532-15

On/Off with Manual Vacuum Regulation Turret , Flush Mount

700563

- Quick opening/closing via ball valve of vacuum line plus manual vacuum control
- Stainless steel On/Off ball valve allows easy repeat of flow rate setting

Connect PTFE 10 mm OD tubing to valve using a PVDF compression fitting. SS Ball Valve has stepped hose barb that accepts 1/4 - 3/8 in. vacuum hose(DN8-10). Dimensions: 6.9 cm(2.7 in.) diameter, 8.2 cm(3.2 in.) protrusion from wall and 2 cm(0.8 in) into wall.

Use With	Connection Type For 10 mm OD PTFE Tubing	CAT. No.
Wood Furniture	PVDF compression fitting(not included)	700563
Sheet Metal Furniture	PVDF adapter, compression fitting to G3/8 male thread (not included)	700563-01

On/Off with Manual Vacuum Regulation Turret, Surface Mount

700535-15

- Quick opening/closing via ball valve of vacuum line plus manual vacuum control
- Stainless steel On/Off ball valve allows easy repeat of flow rate setting

SS Ball Valve has stepped hose barb that accepts 1/4 - 3/8 in. vacuum hose(DN8-10). Dimensions: 6.9 cm(2.7 in.) diameter, 8.2 cm(3.2 in.) protrusion from wall and 2 cm(0.8 in) into wall.

Use With	Connection Type For 10 mm OD PTFE Tubing	CAT. No.
Wall and Wood Furniture	PVDF compression fitting(included in turret assembly)	700535-15

On/Off with Manual Vacuum Regulation Turret with Dial Gauge, Flush Mount

700566 700566-01

- Quick opening/closing via ball valve of vacuum line plus manual vacuum control and dial gauge
- On/Off ball valve allows easy repeat of flow rate setting

Connect PTFE 10 mm OD tubing to turret using a PVDF compression fitting. Stainless steel dial vacuum gauge 0-1000 mbar. SS Ball Valve has stepped hose barb that accepts 1/4 - 3/8 in. vacuum hose(DN8-10). Dimensions: 6.9 cm(2.7 in.) diameter, 8.2 cm(3.2 in.) protrusion from wall and 2 cm(0.8 in) into wall.

Use With	Connection Type For 10 mm OD PTFE Tubing	CAT. No.
Wood Furniture	PVDF compression fitting(not included)	700566
Sheet Metal Furniture	PVDF adapter, compression fitting to G3/8 male thread (not included)	700566-01

On/Off with Manual Vacuum Regulation Turret with Dial Gauge, Surface Mount

700538-04

- Quick opening/closing via ball valve of vacuum line plus manual vacuum control
- Stainless steel On/Off ball valve allows easy repeat of flow rate setting

SS Ball Valve has stepped hose barb that accepts 1/4 - 3/8 in. vacuum hose(DN8-10). Stainless Steel dial vacuum gauge 0-1000 mbar. Dimensions: 6.9 cm(2.7 in.) diameter, 8.2 cm(3.2 in.) protrusion from wall and 2 cm(0.8 in) into wall.

Use With	Connection Type For 10 mm OD PTFE Tubing	CAT. No.
Wall and Wood Furniture	PVDF compression fitting(included in turret assembly)	700538-04

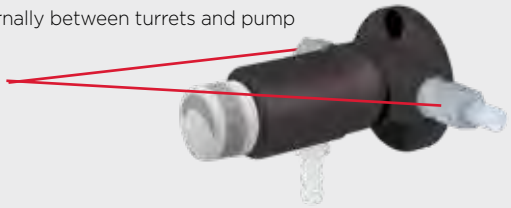
Comparison of Flush Mount Turret Versus Surface Mount Turret

Flush Mount Turret

- Drilled cut outs
- Tubing installed through cut-outs in furniture, wall or fume hood
- Tubing concealed

Surface Mount Turret

- Secure turret with screws
- Installed externally between turrets and pump
- Tubing visible



Fume Hood Turret and Nozzle

Two components are needed for control of vacuum on a fume hood. The manual flow-control turret (CAT. No. 700571) is mounted outside of the fume hood. The nozzle is mounted inside the fume hood.

Manual Flow Control Turret Flush Mount

700571

- Regulation of vacuum on the outside of fume hood

Turret easily mounts to outside wall of fume hood with 2 screws. Turret to be used in conjunction with nozzle (CAT No. 700561 or 700561-01). Dimensions: 69mm(2.7 in.) diameter, 67mm(2.6 in.) protrusion from wall (49mm(1.9 in) into fume hood wall).

Use With	Connection Type For 10 mm OD PTFE Tubing	CAT. No.
Fume Hood	Two PVDF compression fitting(included in turret assembly)	700571
	Kit including turret 700571 and nozzle 700561	700561-20
	Kit including turret 700571 and nozzle 700561-01	700561-21

Nozzle Flush Mount

700561/700561-01

- Nozzle normally located inside a fume hood with external vacuum control

Nozzle is connected via PTFE tubing to manual regulation turret(CAT. No. 700571). Comes with stepped hose barb that accepts 1/4 - 3/8 in. vacuum hose(DN8-10). Dimensions: 6.9cm(2.7 in.) diameter, 7.6cm(3 in.) protrusion from fume hood wall (20cm/0.8 in. into wall).

Use With	Connection Type For 10 mm OD PTFE Tubing	CAT. No.
Fume Hood	PVDF compression fitting(not included)	700561
Fume Hood	PVDF adapter, compression fitting to G3/8 male thread (not included)	700561-01

Mini-Vacuum Network

- Run up to three applications using a single pump
- Easy to mount on wall, fume hood, or lab frame
- Built-in check valves minimizes the risk of cross contamination
- Create six port network by connecting two mini-vacuum networks

700556

The mini-vacuum network is a space-saving and prefabricated, vacuum manifold with three turrets. The turrets are chemically-resistant and allow regulation of flow rate and also turn off/on.

The manifold containing the turrets is easily installed on a lab frame, wall, fume hood or lab furniture. The result is a mini-vacuum network ready to connect to a single vacuum source such as an oil-free chemical duty PTFE diaphragm pump/system or a Wob-l® vacuum pump. Use a high flow pump with two mini-vacuum networks to create a six valve network.

Each turret is equipped with a FFKM check valve. The check valve minimizes the risk of interference/cross contamination between applications when turrets are opened and closed. The mini-vacuum network is leak tight and can operate between 1 and 760 torr. Turrets have stepped hose barbs that accept 1/4- 3/8 in. ID vacuum hose(DN8-10). Hose barb on manifold accepts 1/4 in. ID(DN8) vacuum hose.
Dimensions: LxWxH: 13.8x2.5x3 in.(35x6.4x7.6 cm).

Use With	Description	CAT. No.
2042B-01, 2014B-01, 2044B-01, 2052B-01, 2561B-50, 2581B-50, 2546B-01, 2019B-01	Mini-Vacuum Network with Three turrets.	700556

Compression Fittings, PVDF

- Quick and easy connection of 10mm OD, 8mm ID PTFE vacuum tubing

829930

829983

829945-2

829984

Use With	Description	CAT. No.
10 mm OD PTFE tubing, 700562, 700563, 700566	Tee, 10-10-10	829930
	Elbow, 10-10	829983
	Union, 10-10	829945-2
700571	Elbow, 10-1/4	829984
700562, 700563-01, 700566-01	Straight adapter, 10-3/8 in	829931-3
	Elbow, adapter male 10-3/8 in	829984-2

PTFE Tubing

- Dimensions: 10mm OD & 8 mm ID with 1 mm wall
- Chemically resistant PTFE

828332-5

Type	Tube Size mm	Length, ft(m)	CAT No.
PTFE Tubing	10/8x1	16(5)	828332-5
		32(10)	828332-10
		82(25)	828332-25
		164(50)	828332-50

Tubing For Condenser

- PVC tubing to connect LVS exhaust condenser to tap water

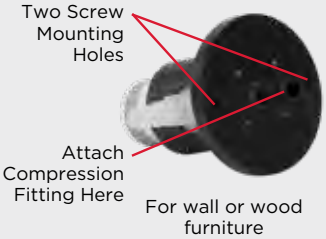
828346-5

Type	CAT. No.
Hose for potable water to condenser 14/8x3	828346-5

Connecting 10 mm OD PTFE Tubing to Flush Mount Turrets

Compression fittings made of PVDF are used to connect turrets to PTFE tubing to pump.

The vacuum network is vacuum tight to 2 mbar(1.5 torr/29.9 in. Hg)



VCB 521 Vacuum Controller

- Quick and easy automated, digital vacuum setting and control
- Controls vacuum level, cooling water and venting

600053

600052-04/600052-05

Controller available in table top version and flush mount for installation into furniture panel. The controller has integrated sensor to measure pressure from 1100-1 mbar (825 – 0.75 torr), display numerical & graphically the vacuum pressure, control vacuum level.

Model	Tubing Connection to Controller In	Tubing Connection to Controller To Pump	Dimensions in. (cm)	CAT. No
VCB 521 cv Table top	¼ in ID(DN8)	¼ in ID(DN8)	7.6x7x4.1 (20x14x11)	600053
VCB 521 Panel Mount	¼ in ID(DN8)	10 mm OD PTFE tubing	9.4x4.7 (24x12)	600052-04
VCB 521 Panel Mount	10 mm OD PTFE tubing	10 mm OD PTFE tubing	9.4x4.7 (24x12)	600052-05

Flush Mount VCB 521 Vacuum Controller with Pump Kit

- External control panel to monitor and control vacuum level, cooling water and venting
- Hardware needed to connect controller to LVS vacuum system

LVS 610 T ef

Kit including LVS vacuum system and flush mount controller. LVS system includes chemical duty diaphragm pump and capture solvent recovery system. Flush mount controller and LVS system is ready to be installed in lab furniture to remotely control the LVS providing vacuum for the WelchNet modular vacuum network.

LVS Model	LVS 310 Z ef	LVS 610 T ef	LVSF 1210 T ef	LVSF 2410 E ef
Free Air Displacement m^3/hr (lpm)	2.6(43)	4.9(81)	12.5(208)	19.5(325)
Ultimate Vacuum Pressure mbar(torr)	<8(6)	<1.5(1.1)	<2(1.5)	<75(56)
Ordering Information				
230V 50/60Hz 1Ph	115244-04	115254-04	116264-02	116274-02
115V 60H 1Ph	116047-11	115254-10	116264-03	116274-05

Peltier Cooling System

- Compact cooling system
- Use to cool condenser on LVS to trap exhaust solvent vapors

112043

Peltier cooling system used to cool the solvent vapors passing thru LVS exhaust condenser. More efficient than use of tap water since cooling systems operates at 7 to 10 °C. compared to warmer tap water. Only for use on exhaust condenser of LVS. Comes complete with connecting tubing to LVS condenser.

Compact cooling system fits under cup space. Saves on tap water usage and is maintenance free.

Type	Dim.(LxWxH) mm	Weight, kg	CAT. No.
KWR 3	350x145x230	5.3	112043

Cooling Water Solenoid Valve for LVS and VCB521

- 2 way water flow valve for the demand-responsive cooling water supply.
- Input: G 3/4 inch sleeve nut,
- output: hose nozzle for hose inside diameters 8 mm

Type	CAT. No.
WV 2 (24V), G3/4 in. - DN8	700300-02

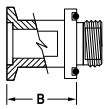
Liquid Level Sensor

- Non-contact sensor to shut down LVS when exhaust is full
- Sends signal to VCB 521 cont roller when liquid level is high and requires emptying

115522

Use with	Volume of Catchpot	CAT. No.
All Models of LVS	500 ml	115522

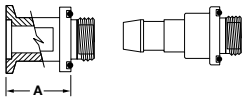
ISO NW Inlet Connectors for High Vacuum Pumps



- Aluminum with o-ring
- No sealant required for installation
- For pumps above listed serial number

ISO	Thread Size	Pump Model	Serial No.	B	CAT. No.
NW 16	3/4-20"	1399	>26461	1.12	1393F
NW 16	3/4-20"	1400, 1400N	>18069	1.12	1393F
NW 25	3/4-20"	1400, 1399, 8905, 8890, 1400N	All	1.12	1393V
NW 25	1-20"	1405	>77703	1.2	1393G
NW 25	1-20"	1380	>2114	1.2	1393G
NW 25	1-20"	1402, 1402N	>133218	1.2	1393G
NW 25	1-20"	1376, 1376N	>14594	1.2	1393G
NW 40	1.75-20"	1374	>73519	1.4	1393H
NW 40	1.75-20"	1397	>51217	1.4	1393H
NW 16	3/4-20"	8905	All	1.12	8905K-05

Connectors for High Vacuum Pumps



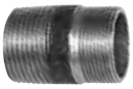
ISO Connector | Hose Connector

- For adding an exhaust line to a pump
- Connectors for vacuum hose and ISO NW

Pump Models	Hose Connector		ISO Connector			
	Hose size	CAT. No.	Thread Size	ISO NW	A	CAT. No.
CRVpro 16, 24, 30	3/4 O.D.[1]	1393E	----	----	----	----
1399, 1400, 8905, 8890	3/8" I.D.	1393D	3/4-20"	NW 16	1.12	1393F
1399, 1400, 8905, 8890	7/16" I.D.	1393J	3/4-20"	NW 16	1.12	1393F
1402, 1380, 1376, 1405	13/16" I.D.	1393K	1-20"	NW 25	1.2	1393G
1374, 1397	1-5/8" I.D.	1393L	1 3/4-20"	NW 40	1.4	1393H
1405, 1402	7/16"	1393M	1-20"	NW 25	1.2	1393G

Note 1: Fitting is NW 25 x 3/4 O.D. flare.

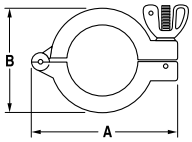
Male NPT Pipe Inlet and Exhaust Adapters



- Black Pipe
- Adapt inlet and exhaust to NPT Thread

Pump Model	Machine Thread	NPT Male Thread	CAT. No.
1400, 1399	3/4-20"	1/2"	1393N
1380, 1402, 1376, 1405	1-20"	3/4"	1393P

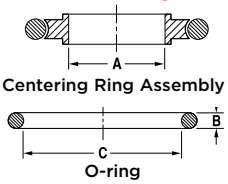
Hinged Clamps



- Aluminum
- Closure by wing and nut bolt

ISO	A	B	Clamp Width	CAT. No.
NW 16	2.612	1.625	0.612	302201
NW 25	2.965	1.950	0.612	302202
NW 40	3.735	2.600	0.625	302203

Centering Assemblies & Relacement O-Rings



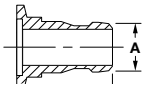
Centering Ring Assembly

O-ring

- Stainless steel centering ring with o-ring
- Replaceable Viton® o-ring seal

	Centering Ring Assembly		Replacement O-Ring		
ISO	A	CAT. No.	B	C	CAT. No.
NW 16	0.630	303101	0.210	0.725	304801
NW 25	0.984	303102	0.210	1.100	304802
NW 40	1.575	303103	0.210	1.600	304803

Rubber Hose Adapters



- ISO NW to rubber vacuum hose

ISO	Hose I.D., in.	Material	A in.	B in.	CAT. No.
NW 16	1/4	Stainless Steel	0.24	1.57	710739
NW 16	7/16	Aluminum	0.625	1.65	501241
NW 16	5/8	Aluminum	0.750	1.65	501251
NW 25	13/16	Aluminum	0.875	1.73	501262
NW 40	1-5/8	Aluminum	1.63	2.17	501283

Red Vacuum Hose Hose Clamps

• Very thick walled hose for vacuum or pressure applications • Convenient worm screw clamps hand tighten

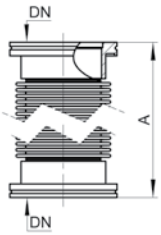
Specifications			Hose Kit CAT. No.				Clamps CAT. No.
I.D.	Wall Thickness	O.D.	5ft. Only	10 ft. Only	15 ft. Only	20 ft. Only	10/Pkg.
3/16"	5/16"	13/16"	331020-5	331020-10	-	-	305320
1/4"*	1/4"	3/4"	331030-5	-	-	-	305320
7/16"	5/16"	1-1/16"	331040-5	331040-10	-	-	305340
5/8"	3/8"	1-3/8"	331050-5	331050-10	-	-	305350
3/4"**	1/2"	1-3/4"	331060-5	331060-10	331060-15	331060-20	305360
1 5/8"	11/16"	3"	331080-5	331080-10	-	-	305380

* Hose works with pumps that accepts 3/8 in. I.D. hose ** 3/4" I.D. hose fits onto Welch 13/16" intake fittings

Flexible Metal Hose

• Alternative to gum rubber vacuum hose • Cleanable with solvents

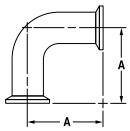
Maximum flexibility is achieved using thin wall, annealed, stainless steel accordion tubing. Each end of tubing has a welded DN(NW) flange to allow quick connection. Materials of construction: tubes 1.4404 and flanges 1.4571



Flange Type	A mm (in.)	CAT. No.
DN 16(NW16)	250 (9.8)	710758
	500(19.7)	710761
	1000(39.4)	710764
	2000(78.7)	710775
DN 25 (NW25)	250 (9.8)	710759
	500(19.7)	710762
	1000(39.4)	710765
	2000(78.7)	710776
DN 40 (NW40)	250 (9.8)	710760
	500(19.7)	710763
	1000(39.4)	710766
	2000(78.7)	710777

90° Degree Elbows

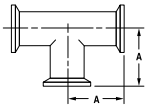
• Stainless steel • Same size flange on both ports



ISO	A	CAT. No.
NW 16	1.50	383101
NW 25	2.04	383102

Tees

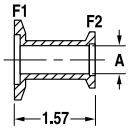
• Stainless steel • Same size flanges on all ports



ISO	A	CAT. No.
NW 16	1.50	384101
NW 25	2.04	384102

Reducers

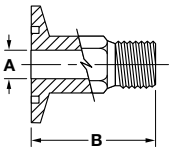
• Stainless steel



ISO Fi	ISO F2	A	CAT. No.
NW 25	NW 16	0.555	387121
NW 40	NW 25	0.900	387132

Female Pipe Adapters

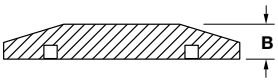
• Male stubs have 1/4 – 18 NPT • Hex shank • Stainless steel



ISO	NPT	A	B	CAT. No.
NW 16	1/4"	0.281	1.1	505121
NW 25	1/4"	0.281	1.1	505122

Blank Off Flanges

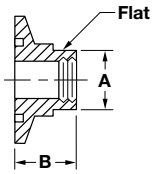
- Stainless steel
- To close off unused ports



ISO	B	CAT. No.
NW 16	0.20	388101
NW 25	0.20	388102

Female Pipe Adapters

- Female threads have 1/4 in. to 1/2 in. NPT
- Stainless steel
- Can be used with brass hose barbs



ISO	NPT	A	B	CAT. No.
NW 16	1/4"	0.62	0.50	506121
NW 25	1/4"	0.88	0.50	506122
NW 25	1/2"	0.88	0.50	506142

Vacuum Oven Adapter Kit

- Easy connection of vacuum pump with DN 16 KF(NW16) or DN 25 KF (NW25) flange to vacuum oven
- Kit includes 2.5 m(8.2 ft) vacuum hose, hose to flange adapters, hinge clamps, and centering rings

Use with Pump Model	CAT. No.
CRVpro 4, 6, 8, 16; MPC 1201T, 1801Z, 2401E, 601 Tp Ex; 2052, 2054, 2163. 2062, 2064, 2067	404005

Freeze Dryer and Concentrator Adapter Kit

- Quick connection of CHEMVAC to freeze dryer or concentrator
- Kit includes hose to flange connector, hinge clamp ring, centering ring and 1.5 m(4.9 ft) of vacuum hose.

Use with Pump Model	CAT. No.
P6Z-101, CRVpro 4, 6, 8	330044
P12Z-301, P23Z-301, CRVpro 16	330045

Hose Adapter Kits

- Kits ensure proper sized tubing adaptors, and clamps for vacuum tight connections
- Kits include at least 5 ft.(1.5m) of thick walled rubber vacuum hose

Adapter Kits For Pump Models	Pump Inlet O.D.	Appliance Connector O.D.	CAT. No.
8890 (GEM)	3/8"	7/16" and 1/2"	1420H-01
1400, 1405, 1399, 8905	7/16"	1/4" and 3/8"	1420H-01
1402, 1380, CRVpro 4, 6, 8, 16	13/16"	1/4" and 3/8"	1420H-02

Tubing Connectors

- Plastic tubing connectors for gum rubber vacuum hose


1395K


357630


357220


829923


710953/710955

Type	Description	Length, in (cm)	Mating Tubing, ID in. (mm)	CAT. No.
Stopcock	Polyethylene two-piece valve. Vacuum tight to to 29.9 in. Hg(1 torr/1.3 mbar), Quarter turn shuts off flow	3.1 (8)	3/8 (10)	1395K
Hose Reducer	Polyethylene stepped straight connector; connect larger ID tubing to smaller ID tubing	3.5 (9)	7/16 to 3/8 (11 to 9)	357220
Hose Reducer	Polyethylene stepped straight connector; connect larger ID tubing to smaller ID tubing	3.5 (9)	13/16 to 3/8(21 to 9)	357630
Y- connector	PP (Polypropylene) barbed connector	3.5 (9)	3/8 (10)	829923
Hose Barb	PP barbed to thread connector, DN 8-G 1/4	2 (5)	1/4 (8)	710953
Hose Barb	PP barbed to thread connector, DN 10-G 1/4	2 (5)	3/8 (10)	710955

DRY ICE / ISOPROPANOL TRAP (-79˚C)

1420H-14

- Recommended for use with freeze dryer, Schlenk line, concentrator and vacuum oven.
- Uses dry ice or liquid nitrogen as refrigerant
- Removable center make trapping surface easy to clean

DryIce/Liquid Nitrogen Cold Trap is an effective foreline cold trap for vacuum manifolds or Schlenk Lines. The trap has a large 3 quart (2.8 liters) center well for the dry ice/isopropyl alcohol slurry or liquid nitrogen; traps up to 1.5 liter condensate. With dry ice, cold temperature may be maintained for up to 12 hours depending upon the vapor load. With liquid nitrogen, cold temperature can be maintained for up to 2 hours depending upon the vapor load.

Trap Connection	Height, in.(cm)	Diameter, in.(cm)	In/Out Offset, in.(cm)	CAT. No.[1]
7/16 in. I.D. tubing (18/8x5)	8.25	10.75	3.5	1420H-14

Note: 1. Gasket replacement kit 1420K-01

Acid Neutralization Trap

1420K-25

- Neutralizes acidic vapors
- Element changes color when spent

The acid neutralization trap contains a large alkaline (calcium hydroxide) element cartridge to neutralize hydrous acids before they enter the vacuum pump. The element changes from white to bluish-transparent when spent and can be observed through the transparent trap body. For high vapor loads, place a cold trap between acid neutralization trap and pump to avoid rapidly saturating element.

Pump FAD, lpm (m^3/hr)	Trap Connection	Dimensions LxW in.(cm)	Trap CAT. No.	Replacement Element CAT. No.	Pump Connection Kit CAT. No.[1]
<100 (<6)	DN 16 KF (NW16)	8x5.5(20x14)	1420H-21	1420E-02	1420K-16
101- 500(6 to 30)	DN 25 KF (NW25)	12.8x5.5(33x14)	1420H-20	1420E-01	1420K-25

Note: 1. Kit CAT. No. 1420K-16 includes KF 16 elbow, hinge clamp and centering ring and Kit CAT. No. 1420K-25 includes KF 25 elbow, hinge clamp and centering ring.

Inlet Catchpot AKS

- Protects the vacuum pump from liquid ingestion

Catchpot trap mounts directly on inlet of pump via KF (NW) flange connection. Properly maintained trap prevents ingestion of liquid by pump. Liquid ingestion will cause pump to fail.

Pump Model	Flange Connection	Height, cm	Arm Reach, cm	CAT. No.
CRVpro 4/6/8, MPC 1201 T, 1801 Z, 2401 E, 2052, 2062, 2054, 2064	DN 16 KF (NW 16)	8.25	2.5	320016
CRVpro 16/24/30	DN 25 KF (NW 25)	8.25	2.5	320018
2070, 2071, 2080	DN 25 KF (NW 25)	8.25	10	320018-01

Inlet/Exhaust Separator Jars

1423B

230 ml glass jar assembly attaches to pump intake or exhaust to capture ingested liquids.

Pump Model	CAT. No.
2014, 2032, 2034, 2037, 2042, 2044, 2047	1423B

PARTICULATE, HYDROPHOBIC IN-LINE FILTERS

1475K-21

1475K-23

1475K-22

The filters are an economical solution to protect your WOB-L® piston vacuum pump from fine particulates and aerosols to 0.2 microns in diameter. Made of Polypropylene housing.

Pump Model	Porosity	Hose I.D. in.	Pack Qty.	CAT. No.
2511, 2515, 2522, 2534,2546	0.8 micron	1/4 to 3/8	10	1475K-21
2561, 2581, 2562, 2567	0.8 micron	1/4 to 3/8	1	1475K-22
2562, 2567	0.2 micron	1/4	1	1475K-23

Tubing CAT. No. 331040-5, gasket replacement kit 1420K-01.

Application Note | Cold Traps

Cold traps employing a dry ice slurry or liquid nitrogen are effective as long as the refrigerant level is maintained. If the trap warms up while the pump is running, all of the trapped condensables will be ingested by the vacuum pump, contaminating the oil.

Cold traps must be cleaned out at the end of each day. If the pump is run overnight, the trapped condensables will ultimately be ingested by the pump as the trap warms up. Cleaning a Dry Ice Slurry/Liquid Nitrogen trap is easy. The steps are: 1. Turn off the pump. 2. Leak air into the trap from the application side. 3. Remove the center well and polypropylene ring to a hood. The center well can be washed off into a beaker or the condensables can be allowed to evaporate in the hood or added to the laboratory waste.

Rotary Vane Pump Standard Exhaust Filter

- Filters oil mist from pump exhaust
- Easy replacement of element
- Reduces pump noise
- Filters to 0.3 micron particle size
- Screw-in type

1417P-8

1417P-10

1417P-11

Use With Pump Model	Diameter (in.)	Height (in.)	Filter w/ Case CAT. No.	Filter Element Only CAT No.
CRVpro 4, 6, 8	2.5	5	1417P-8	1417R
CRVpro 16, 24, 30	5	9	1417P-11	1417H-01
8890[1], 8905, 1399, 1400, 1400N	2.5	2.5"	1417	1417L
1376, 1402, 1405, 1402N, 1376N	5.0	6.25"	1417P-10	1417G
1397, 1374	5.0	9.0"	1417P-20	1417H-01
8917A-80, 8917C-80	2.5	4.5"	1417P-7	1417R

Note: 1. GEM® (8890) includes 1417 as standard equipment.

Rotary Vane Pump Directional Exhaust Filter

- Large, high capacity
- 360° Swivel outlet with tubing connector
- Screw-in type
- Continuously separates oil mist from the vacuum pump exhaust and by gravity returns the oil to the pump

1417A

1417D

1417C

Use With Pump Model	DxH (in.)	Outlet Tube O.D. (in.)	Filter w/Case CAT. No.	Filter Element CAT. No.	Gasket Repl. CAT. No.
CRVpro 4, 6, 8	5 X 8.5	1	1417C	1417G	1417A-01
CRVpro 16, 24, 30	5 X 9	1	1417D	1417H	1417B-01
1376, 1380, 1402, 1405, 1402N, 1376N	5 x 7.5	1.0"	1417A	1417G	1417A-01
1374, 1397	6.5 x 10	2.0"	1417B	1417H	1417B-01

Rotary Vane Pump OME Oil Mist Filter

- Direct assembly via flange on exhaust side of the pump
- Transarent housing allows easy monitoring of filter condition
- Minimizes the output of oil mist

700010

Use With Pump Model	DxH in.(mm)	Inlet/Outlet Flange	Filter w/Case CAT. No.	Filter Element CAT. No.
CRVpro 4/6/8	2.1 x 4.1(53x104)	DN 16 KF	700010	800160
CRVpro 16	2.1 x 4.1(53x104)	DN 25 KF	700011	800160

Rotary Vane Pump AKD Oil Mist Separator

- Direct assembly via flange on exhaust side of the pump
- Transarent catchpot allows easy monitoring of filter condition and easy draining of oil
- Separates nearly 100% of oil mist @ blank-off

320015

Use With Pump Model	DxH in.(mm)	Inlet/Outlet Flange	Filter w/Case CAT. No.	Filter Element CAT. No.
CRVpro 4/6/8	4.4 x 6.7(112x170)	DN 16 KF	320015	800160
CRVpro 16	4.4 x 6.7(112x170)	DN 25 KF	320017	800160

Hermetically Sealed Oil Mist Eliminators

- Prevents corrosive vacuum pump exhaust gases from escaping into the room
- Coalesces oil mist from the pump exhaust and allows it to drain back into the pump
- Coalescing the oil mist prevents loss of oil and the frequent need to add expensive vacuum fluids
- Stainless steel construction with borosilicate microfiber element and fluoroelastomer gaskets
- Requires, but does not include pump adapter kit
- CAT No. 1416D exhaust port accepts 13/16 in. I.D. hose.

1416D

Use With Pump Model	DxH in.(mm)	Mist Eliminator CAT. No.	Pump Adapter Kit CAT. No.	Repl. Element CAT. No.
1400N	5x7.8(127x198)	1416D	1416E-01	1417Y-05
1402N, 1376N	5x7.8(127x198)	1416D	1416E-02	1417Y-05

Exhaust Oil Recycler

Exhaust Mist Eliminator shown installed on pump with oil return line.

Exhaust oil recyclers are recommended for vacuum systems with continuous pressure of 1 torr (1 mm Hg) or higher. 1. At these pressures, conventional exhaust filters quickly saturate. The Mist Eliminator System continuously separates oil mist from the vacuum pump exhaust and actively returns the oil to the pump.

Vacuum Pump Model No.	CAT. No.
8890 (GEM)	1416B
8905	1416H
1400, 1400N	1416H-01
1376, 1376N, 1402, 1402N, 1405	1416C-01

Note: 1. CAUTION: Two stage vane vacuum pumps such as models 8905, 1400, 1402, 1376, 1405, 1400N, 1402N and 1376N should not be operated continuously at pressures above 10 torr.

MP Diaphragm Pump Exhaust

829901

- Exhaust silencers are installed in the exhaust port of the vacuum pump to reduce pump noise.

Use With Pump Model	DxH in.(mm)	Thread Size	CAT. No.
MP 060 E, MP 055 Z, MP 105 E	XXX	G-1/8 in.	400942
MP 101 Z, MP 101 V, MP 201 T	XXX	G-1/4 in.	829901
MP 301 E	XXX	G-1/4 in.	400941
MP 301 Z, MP 301 V	XXX	G-1/4 in.	400596
MP 601 E, MP 601 T, MP 901 Z, MP 1201 E	XXX	G-1/4 in.	829901

Standard Duty (WOB-L) Exhaust Silencer

1412C

1412D / 1412E

- Exhaust silencers are installed in the exhaust port of the vacuum pump to reduce pump noise

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Use With Pump Model	DxH in.(mm)	Thread Size NPT	CAT. No.
2565, 2585	0.6 x 1.5(15 x 38)	1/4	1412C
2561	0.6 x 1.5(15 x 38)	1/4	1412D
2581	0.9 x 2.6(23 x 66)	3/8	1412E

Capture Vapor Recovery System DryFast® & Self Cleaner

1420H-18

- Captures vapor at the outlet enabling nearly 100% solvent recovery to protect lab air quality
- Includes condenser, 1 liter round bottom flask, tubing support and clamps
- Mounts easily to your DryFast or Self Cleaner pump
- Requires cooling water for condenser

Use With DryFast and Self Cleaner Models	CAT. No.
2025, 2026, 2027, 2028, 2014, 2032, 2034, 2042, 2037, 2044, 2047	1420H-18

LVS Replacement Condenser Assembly Kit

700183-08

700183-11

828857-18

828839

- Captures vapor at the outlet enabling nearly 100% solvent recovery to protect lab air quality
- Kit includes condenser, solvent recovery flask and clamp
- Requires cooling water for condenser

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Use With LVS System Model	DxH in.(mm)	CAT. No.
All LVS Models except LVS 105 T -10 ef	XXX	700183-08
LVS 105 T -10 ef, coated	XXX	700183-11
Receiving flask coated, 500 ml	XXX	828839
Drain for LVS condensers, with hose barb DN, 10 with KS 35	XXX	828857-18

Vacuum Pump Oils

Gold Vacuum Pump Oil

- Exceptionally low vapor pressure
- High stability in chemical environments
- No additives or inhibitors
- Recommended for Welch belt-drive and direct-drive pumps

A double distilled synthetic hydrocarbon oil designed for excellent resistance when pumping corrosive gases or vapors. A synthetic base stock that has no aromatic compounds or sulfur which accelerate varnishing, sludging and carbon build-up when pumps are used to pump corrosives. Gold oil will give a longer service life and superior protection for the internal metal components of a pump in corrosive pumping applications compared to DuoSeal® and Premium Oil. Gold Oil offers excellent vacuum pressure in both belt-driven and direct-driven vacuum pumps over time. Gold Oil is miscible with conventional hydrocarbon oils and can be used without rebuilding the pump. The oil is clear and colorless.

Ordering Information			
Size	Liter	Gallon	5 Gallon
CAT. No.	8995G-11	8995G-15	8995G-20

Premium Vacuum Pump Oil

- Low vapor pressure
- Designated for high RPM direct drive vacuum pumps
- No additives or inhibitors
- Recommended for Welch direct-drive vacuum pumps

A triple-distilled hydrocarbon oil using severely hydrotreated base stock is designed to resist breakdown at higher RPMs and operating temperatures of direct-drive vacuum pumps. The hydrotreating virtually eliminates aromatics and sulfur to give good resistance to sludge and varnish formation overtime in corrosive environments. Premium oil enables direct-drive vacuum pumps to maintain the highest vacuum performance over time. The oil is light yellow.

Ordering Information			
Size	Liter	Gallon	5 Gallon
CAT. No.	8995P-11	8995P-15	8995P-20

DuoSeal® Vacuum Pump Oil

- Low vapor pressure
- Ideal viscosity for belt-drive vacuum pumps
- High consistency
- Recommended for DuoSeal belt-drive pumps

A specially fractionated oil for DuoSeal belt-driven pumps is designed to ensure the highest vacuum performance. The oil is tested to high vacuum levels to meet rigid requirements for vapor pressure, vacuum level stability, and viscosity. DuoSeal oil is famous for its quality and consistency.

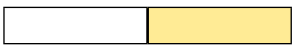
Ordering Information			
Size	Liter	Gallon	5 Gallon
CAT. No.	1407K-11	1407K-15	1407K-20

Make The Clear Choice

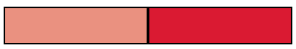
8995G-11

Pump Oil Condition Color

Good Oil



Bad Oil (Possible Pump Damage)



The choice is clear. Pump oil can become contaminated with ingested fluids and vapors. Use recommended pump oil and change your pump oil regularly. Cloudy and discolored oil will lead to premature pump failure.

Make the clear choice and change your oil regularly.

Labovac 10 - Mineral Oil

For Two-stage Welch Rotary Vane pumps and Chemvac´s. To pump air, inert gases and noble gases. Vapor pressure 10^{-6} mbar. Viscosity 118 cst at 40˚C. Flash point 270˚C. Density 0.888 g/ml @ 15˚C.

Remarks:
Oil Service cycles can be extended by using a oil-filter.

Ordering Information					
Size	1 Liter	5 Liters	10 Liters	20 Liters	200 Liters
CAT. No.	800122	800120	800123	800124	80019

Labovac 11 - Synthetic Oil

Used for high operating temperatures > 100°C, specially in One-stage rough vacuum rotary vane pumps. Vapor pressure 10^{-5} mbar. Viscosity 110 cst at 40˚C. Flash point 260˚C.
Density 0.960 g/ml @15˚C.

Remarks:
Do not pump any inorganic acids. Ultimate pressure up to 0.5 mbar(torr).

Ordering Information			
Size	1 Liter	10 Liters	20 Liters
CAT. No.	800125	800126	800127

Labovac 12S - Paraffin Mineral Oil

For pumping air, chemically inert permanent gases – water vapour, solvent vapors. Vapor pressure 10^{-8} mbar. Viscosity 94 cst at 40˚C. Flash point 260˚C. Density 0.886 g/ml @15˚C.

Remarks:
Oil Service cycles can be extended by using a chemical oil-filter. Pump should operated with a cold trap.

Ordering Information			
Size	1 Liter	10 Liter	20 Liter
CAT. No.	800128	800129	800130

Labovac 13 - PFPE Oil

For pumping strong oxidants like oxygen, ozone and reactive substances (halogens). Vapor pressure 10^{-6} mbar. Viscosity 120 cst at 40˚C. Density 1.890 g/ml @15˚C.

Remarks:
Mixing with other types of oil must be absolutely avoided. We recommend to order the rotary vane pump directly with these vacuum oil to ensure best performance.

Ordering Information				
Size	1 Liter	2 Liter	5 Liter	10 Liter
CAT. No.	800131	800132	800133	800134

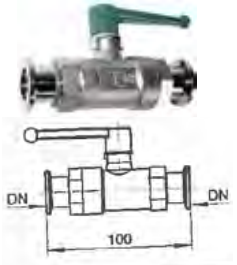
Labovac 14 - Polyalphaolefin (PAO) oil

For pumping of chemically inert permanent gases – water vapor and solvent vapors. Improved cold starting at low temperatures. Vapor pressure 10^{-6} mbar. Viscosity 47.9 cst at 40˚C. Flash point 257˚C. Density 0.918 g/ml @15˚C

Remarks:
A oil-filter is strongly recommend. Ultimate pressure up to 10^{-2}mbar(torr).

Ordering Information				
Size	1 Liter	2 Liter	5 Liter	10 Liter
CAT. No.	800135	800136	800137	800138

Fine Vacuum 2-Way Ball Valve

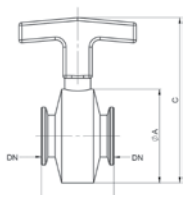


- Handle to turn valve off/on
- Leak tight in both directions

Leak rate <10^{-5} mbar l/s. Materials of construction: Brass nickel plated valve body, polished brass ball, graphitized plastic and FFKM seals. Straight thru flow.

Type DN...KF	A mm	CAT. No.
DN 16 (NW16)	100	700047
DN 25 (NW25)	130	700048
DN 40 (NW40)	160	700049

High Vacuum Butterfly Valves

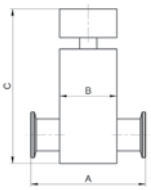


- Very high conductance
- Quick open / quick close with positive locks
- Straight thru flow

Leak rate <10^{-7} mbar l/s. Materials of construction: Housing in stainless steel or aluminum and seal made of FKM.

Type DN...KF	Housing Material	A mm	B mm	C mm	CAT. No.
VK 16 HE	Stainless Steel	65	50	110	704522
VK 25 HE	Stainless Steel	80	50	130	704523
VK 40 HE	Stainless Steel	90	60	140	704524
VK 16 HA	Aluminum	65	50	110	704526
VK 25 HA	Aluminum	80	50	130	704527
VK 40 HA	Aluminum	90	60	140	704528

High Vacuum In-Line Valve

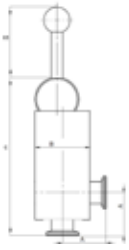


- Long life bellow seal
- High conductance
- Leak tight in both directions

Leak rate of 10^{-9} mbar l/s. Materials of constructions: Housing and bellows made of stainless steel.

Type DN...KF	A mm	B mm	C mm	CAT. No.
VS 16 HSE	80	50	130	700113
VS 25 HSE	100	50	135	700104
VS 40 HSE	130	70	170	700114

High Vacuum Angle Valve



- Long life bellow seal
- High conductance
- Leak tight in both directions

Leak rate of 10^{-9} mbar l/s. Materials of constructions: Housing and bellows made of stainless steel.

Type DN...KNF	A mm	B mm	C mm	CAT. No.
VA 16 HE	40	50	130	700112
VA 25 HE	50	50	135	700102
VA 40 HE	65	70	155	700103

Vacuum Regulator With Inlet Separator Jar

2585K-50 / 2565K-50

The 2585K-50 and 2565K-50 include an inlet trap to help prevent ingestion of fluids into the pump, a dial gauge for continuous vacuum level monitoring and a regulator bleed valve to adjust vacuum levels. Both models have 3/8" inlet hose barb, 2585 has 3/8" NPT male mount and 2565 has 1/4" NPT male mount

Pump Model	Connection	CAT. No.
2585, 2581, 2580	3/8" inlet bose barb, 3/8" NPT male mount	2585K-50
2567, 2563, 2562, 2561	3/8" inlet bose barb, 1/4" NPT male mount	2565K-50

Vacuum and Pressure Regulator For WOB-L Vacuum Pressure Station

2522K-05

2522K-06

The 2522K-05 vacuum regulator is designed to run from slightly below atmospeheric to the maximum vacuum level of the pump.

The 2522K-06 pressure regulator is designed to control from atmospheric to the maximum rated pressure of the pump.

Pump Model	Connection	CAT. No.
2522, 2534, 2546	1/4" male NPT, to vacuum inlet	2522K-05
2522, 2534, 2546	1/4" male NPT, to pressure inlet	2522K-06

Vacuum Regulator With Dial Gauge

700459

700458

Chemical resistant vacuum bleed valve regulators with stainless steel gauges, polypropylene construction with PVDF hose barb for 1/4"(8mm) ID vacuum hose.

Pump Model	Connection	CAT. No.
2052,2054, MP/MPC 301 Z, 601 E, 901 Z, 1201 E	1/4" SPT male mount	700458
MP/MPC 095 Z, 110 E, MPC 105 T, MPC 155 Z	Mounts to shroud	700459

Vacuum Regulator With Digital Gauge

700459-01
700459-02

Chemical resistant vacuum bleed valve regulator digital gauge.

Pump Model	Connection	CAT. No.
MP/MPC 095 Z, 110 E, MPC 105 T, MPC 155 Z	Mounts to shroud	700459-01
MP/MPC 095 Z, 110 E, MPC 105 T, MPC 155 Z	Mounts to shroud	700459-02

Vacuum Regulator With Liquid Trap

700458-01
700458-02

Chemical resistant vacuum bleed valve regulators with stainless steel gauges, polypropylene construction with PVDF hose barb for 1/4"(8mm) ID vacuum hose.

Pump Model	Connection	CAT. No.
MP/MPC 095 Z, 110 E, MPC 105 T, MPC 155 Z	Mounts to shroud	700458-02
MPC 301 E	1/4" SPT male mount	700458-01

Wide Range Vacuum Gauge & Controller

MRV 100

CAP 101/121

PIZA 111/111 cr

PEN 101

4 Sensor Switch Box

- Dual display shows pressure and operating status
- Control external process equipment

Model MRV 100 will measure the vacuum pressure measurement from atmospheric pressure to 10-8 mbar(torr) depending on sensor. Order separately the sensor that matches with the operating vacuum pressure range of your vacuum process or buy a kit with MVR100, sensors, etc. The gauge automatically searches for the connected sensor and initializes the respective interface. Vacuum pressure readout selectable between mbar, torr and pascal.

MRV 100 has two mechanical power relays for controlling external process equipment such as solenoid valves(sold separately). Power relay contacts – 230V, 4A, independently adjustable. With use of solenoid valve, the vacuum pressure may be controlled from 1013 to 10^{-3} mbar(760 to 10^{-3} torr).

MRV comes with 0-10V recorder output, data logger, USB interface and PC software kit. Electrical requirements ar 110-240V, 50/60Hz with Schuko, UK and US plug leads. Dimensions LxWxH: 3.6x4.73.6 in.(9x12x9 cm).

Model	Description	Vacuum Connection on Sensor	CAT. No.
MRV 100	Multi-range gauge/controller	---	600081-US
Model	**Description**	**Vacuum Connection on Sensor**	**CAT. No.**
CAP 101	Capacitive, 1000-1 mbar(785-1 torr)	DN 16 KF (NW16)	620088
CAP 121	Capacitive, 200-10^{-1} mbar(150 - 10^{-1} torr)	DN 16 KF (NW16)	620089
PIZA 111	Piezo/Pirani, 1050-10^{-3} mbar(785 – 10^{-3} torr)	DN 16 KF (NW16)	620002-02[1]
PIZA 111 cr	Piezo/Pirani, 1050-10^{-3} mbar(785 – 10^{-3} torr)	DN 16 KF (NW16)	620002-04[1]
PEN 101	Cold Cathode	DN 25 KF (NW25)	620090
4-Sensor Switch Box	Connection for up to 4 CAP or PIZA sensors or 2 PEN sensors at one time		600081-01

Note: 1. Connection cable CAT. No. 620091 purchased separately.

Vacuum Control Packages Atmosphere to 10^{-3} Torr

*Pump not included

- Easy to assemble kit to control vacuum pressure

The vacuum control packages are cost-effective solution for controlling vacuum pressure to 10^{-3} torr (0.001 mbar). Easy to adapt to two-stage rotary vane pumps on the inlet flange. Package includes MRV 100, vacuum sensor, T-connection, solenoid valve, hinge clamp, and centering ring. Pump not included.

Use with Pump Model	Vacuum Connection	CAT. No.
CRVpro 4, 6, 8, 1400, 1405, 1402	DN 16 KF (NW16)	330053
CRVpro 16, 24, 1376	DN 25 KF (NW25)	330054

Vacuum Controller, Table Top 825 to 1 Torr

- Controls vacuum level, venting and cooling water
- Two-point vacuum control via in-line PTFE solenoid valve
- Chemically resistant ceramic diaphragm sensor

Digitally displayed user-friendly operating instructions. Controls vacuum from 1100 to 1 mbar (825 to 1 torr). Turn and press jog wheel for menu selection. Illuminated display to show graphically vacuum level vs time. Multiple language options (English, German, Spanish, French and Russian). May operate from PC with RS 232 port (requires control software, CAT. no. 620037). Store up to 3 vacuum pressure vs time ramps. Vacuum pressure units of mbar, torr, psi and hPa. Connect pump and apparatus using 3/8 in. ID tubing (DN 8). Electrical requirement 90-260V, 50/60Hz and includes Schuko, UK and US plug. Dimensions LxWxH in.: 7.6x5.5x4.1 in. (20x14x11 cm).

Model	Sensor	Controller CAT. No.	Spare sensor
VCB 521 cv	Internal	600053	---
VCB 521 es	External	600066	620052-04

Digital Vacuum Regulator 700 to 2 Torr

- Controls vacuum level from 700 to 2 torr. Reads vacuum from 760 to 2 torr.
- Two-point vacuum control via in-line PTFE solenoid valve
- Internal chemically resistant piezoelectric sensor

A membrane keypad and intuitive menus enable easy vacuum control via process time and vacuum pressure set points. Controls vacuum from 700 to 2 torr (933 to 2 mbar). User designates 1 or 2 point vacuum level set points to control vacuum levels for a designated timed runs for up to five programs. Controller may be placed on bench surface or mounted on a hood rack with the provided thumbscrew fitting. Vacuum pressure units of torr, mbar, and pascal. Connect pump and apparatus using ¼ ID tubing(DN 7). Dimensions LxWxH in.: 7.3x5.2x5.6 in.(19x13x14 cm). Weight 2 lbs(0.9 kg). Shipping dimensions LxWxH: 12x9x12 in.(19x13x14 cm). Shipping wt. 6 lbs(2.7 kg).

Model	Electrical Requirement	CAT. No.
1640	115/230V, 50/60Hz	1640A-01

Piza 101 Vacuum Gauge 1050 to 1 mbar

- External chemically resistant ceramic diaphragm sensor
- Handheld vacuum meter

External vacuum sensor may be connected via KF 16 (NW16) flange to pump or apparatus using 3/8 in. ID tubing (DN 8). LCD read-out. Operates on standard 9V battery or with AC/DC adapter. Comes with sensor, cable and AC/DC adapter plus 9V battery. Includes Schuko, UK and US plug adapter. Dimensions LxWxD 4.9x3.1x1.4 in.(12x8x4 cm). Select chemical duty version for harsh chemical fume measurements.

Model	Range mbar	Gauge CAT. No.	Spare Sensor CAT. No.
PIZA 101	1050-1	600071-US	620002-01
PIZA 101 Chemical Vapors	1050-1	600074-US	620002-03

Torr Range Vacuum Gauge 760 to 1 Torr

1520B-01

Kit 1520K-10

- Internal piezoelectric reads results to a large LCD display
- Available as stand alone unit or in a kit CAT No. 1520K-10
- Mercury free

Take fast, easy vacuum measurements from 1 to 760 torr (1013 mbar) at multiple locations with this portable vacuum gauge. Use standard 3/8" ID vacuum hosing to connect to vacuum source. Operates on standard 9V battery or using AC adapter. Meter dimensions: 3-5/8"Wx1-1/4"Dx5-3/4"H. Available as standalone unit or in convenient carrying case kit with frame case/stand, battery, AC adapter, and vacuum hosing length. Stands upright using optional protective frame case only provided in kit CAT No. 1520K-10

Model	Description	CAT No.
1520 Gauge only	Standalone unit (set up default in torr)	1520B-01
1520 Gauge in kit	Carrying case kit includes gauge, frame case/stand, battery, AC adapter (for US plug) and vacuum hosing length	1520K-10
1520 Gauge only	Standalone unit (set up default in mbar)	1520C-02
1520 Gauge in kit	Carrying case kit includes gauge, frame case/stand, battery, AC adapter (for Schuko and UK plug), and vacuum hosing length	1520K-11

Diagnostic Themocouple Vacuum Gauge 1 to 2000 Millitorr

- Display numerically and graphically vacuum pressure
- Vacuum analytics for leak, outgassing and pump-down
- Audible vacuum set point

Thermocouple vacuum gauge is used to measure vacuum level between 1 and 2000 millitorr (0.001 to 2.7 mbar). Graphical tracking used to monitor pump down of a chamber. Vacuum pressure units of millitorr, micron, in. of Hg, mm of Hg, in. of water, mbar, torr, psi, PSIA, Pa, and kPa. Gauge calibrated for direct read-out of nitrogen or air. Operates on (4) AA batteries, or user supplied external DC power. Includes folding stand, carrying case and batteries. Sensor tube connects to system via 1/8 in. male NPT.
Dimensions LXWXD: 6x3.5x1.3 in.(15x9x3 cm).

Model	Description	Gauge CAT. No.	Replacement Sensor CAT. No.
1526	Gauge with frame stand , carrying case, (4) AA batteries	1526K-10	1526A

Analog Thermocouple Vacuum Gauge 0 to 5000 Millitorr

- Analog meter movement
- Sits on benchtop
- 0 to 10 VDC recorder output

Thermocouple vacuum gauge is used to measure vacuum level between 1 and 5000 millitorr. Gauge calibrated for direct read-out of nitrogen or air. Sensor tube connects to system via 1/8 in. male NPT. Electrical requirements 11V, 60Hz, 1Ph with N. Amer plug. Dimensions LxWxH: 7x5x5.6 in (18x13x14 cm). Weight: 2 lbs. (0.9 kg).

Description	Gauge Cat. No.	Replacement Sensor CAT. No.
Gauge with one sensor tube and cable	1515	1515A

Pirani Vacuum Gauge 1050 to 10-3 mbar

- Combination Piezoelectric & pirani sensor
- Handheld vacuum meter

External pirani vacuum sensor may be connected via KF 16 (NW16) flange to pump or apparatus using 3/8 in. ID tubing(DN 8). LCD read-out. Operates on standard 9V battery or with AC/DC adapter. Comes with sensor, cable and AC/DC adapter plus 9V battery. Includes Schuko, UK and US plug adapter. Dimensions LXWXH: 3.1x1.4x4.9 in.(8x4x12 cm).

Model	Description	Gauge CAT. No.	Spare Sensor CAT. No.
PIZA 111	Comes with sensor, cable and AC/DC adapter plus 9 V batter	600072	620002-01

Pirani Vacuum Gauge w/ Chemically Resistant Sensor 1050 to 10-3 mbar

- Vacuum sensor gold plated for chemical resistance
- Combination Piezoelectric & pirani sensor
- Handheld vacuum meter

Chemically resistant external vacuum sensor may be connected via KF 16 (NW16) flange to pump or apparatus using 3/8 in. ID tubing(DN 8). LCD read-out. Operates on standard 9V battery or with AC/DC adapter. Comes with sensor, cable and AC/DC adapter plus 9V battery. Includes Schuko, UK and US plug adapter. Dimensions LXWXH: 3.1x1.4x4.9 in.(8x4x12 cm).

Model	Description	Gauge CAT. No.	Spare Sensor CAT. No.
PIZA 111 cr	Comes with sensor, cable and AC/DC adapter plus 9 V battery	600074	620002-03
	Comes with sensor, cable, carrying case, vacuum pump adapter kit and vacuum hose and AC/DC adapter plus 9 V battery	600074-01	620002-03

Handvac Pipettor System

1475K-10 1475K-04

The handheld pipetttor system (1475K-10) provides pressure sensitive button control and enables clean transition between samples using a slight residual suction to prevent drippage; closing the adjustment screw stops all residual vacuum. Auoclavable

CAT No.	Description
1475K-10	Handheld pippetor with 1 channel stainless steel 40 mm aspiration adapter and Pasteur pipette adapter
1475K-04	Replacement rubber adapter for Pasteur pipette adapter

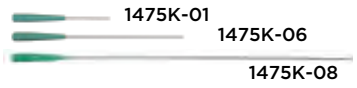
Pipettors for Disposable Pipette Tips

1475K-03 1475K-09 1475K-05

- Adapters with tip ejector; Autoclavalble

CAT No.	Description
1475K-03	1-channel adapter for disposable tips, without ejector
1475K-05	8-channel adapter for disposable tips, with ejector
1475K-09	Pipettors for disposable pipette tips

Cannula-Style Needles



1475K-01
1475K-06
1475K-08

- Stainless steel tips; Autoclavable

CAT No.	Description
1475K-01	Adapter, stainless steel tip, 40 mm
1475K-06	Adapter, stainless steel tip, 150 mm
1475K-08	Adapter, stainless steel tip, 280 mm

Microliter Format Manifolds

1475K-02 1475K-07

- Work well with wide range of media.

CAT No.	Description
1475K-02	8 channel adapter, stainless steel tips, 40 mm
1475K-07	4-channel adapter, stainless steel tips, 40 mm
1475K-20	Spare receiver kit-includes: 6 ft. tubing, 1.2 autoclavable jar w/lid and two hydrophobic filters

On/Off Foot Switch For DryFast & WOB-L* Pumps

1430A
1430B
1430C

- Hands free On/Off pump operations
- No adapters or special connections needed
- Plugs directly into the power source

On/Off foot switches are compatible with selected dry vacuum pump models. Switches handle up to 15 amps.

CAT. No. 1430A & 1430B come with a 3-prong U.S. standard plug with 8 Ft. cord, CSA, NEMA & UL enclosure type 1. CAt. No..1430C comes with a male and female IEC plug, 8Ft. cord, CE and plugs directly into the IEC connection on the pump.

Power	Switch Logic	CAT. No.
115V/60Hz	Maintained On/Off	1430A
115V/60Hz	On when pressed/normally off	1430B
90-230V with IEC connections	On when pressed/normally off	1430C

* Except Models 2511, 2522, 2534, 115V versions

Inlet/Exhaust Catchpot Replacement Jars

1415B

1415C

- Glass and plastic replacement jars.

Pump Model	KIT No.	Description
2025, 2026, 2027, 2028	1415B	Replacement Jars; Glass,
2561B-50, 2567B-50, 2581B-50, 2585B-50 2561C-50, 2567C-50, 2581C-50, 2585C-50	1415D	Replacement jar polypropylene
2522, 2546, 2534	1415C	Replacement jar polypropylene

Replacement Receivers for Aspiration Stations

1475K-20

828840

- Replacement receiver kits

Pump Model	KIT No.	Description
2511B-75, 2511C-75, 2515B-75, 2515C-75	1475K-20	Includes a 1.2 liter autoclavable receiver, 6ft. of tubing and two hydrophobic filters.
Biovac 106	828840	Replacement 5L glass receiver
Biovac 106	112523-7	Replacement 4L plastic receiver

Chemstar Dry

- One and two head diaphragm service kits
- Replacement diaphragm pump replacement kit
- Blower replacement kit

Pump Model	KIT No.	Description
2070, 2071, 2080	2047K-01	One Head Service Kit
	2047K-02	Two Head Service Kit
2070	2070K-50	Replacement diaphragm pump for CAT. No. 2070C-02
	2070K-60	Replacement diaphragm pump for CAT. No. 2070B-01, 2071B-01
2070, 2071, 2080	2700D-01	Replacement vacuum blower

Model 8917A-80 with Acid Neutralization & Oil Filtration

- Repair kits for pump
- Replacement Element for Oil Sump

Pump Model	KIT No.	Description
8917	8917K-04	Minor repair kit for 8917
	1420E-03	Replacement element oil sump

Diaphragm Pump Model 2019

- Diaphragm service and pump head rebuild kits

Pump Model	KIT No.	Description
2019	2019K-01	One-Head diaphragm service kit
	2019K-03	Pump hed and rebuild kit
	2500K-04	Service kit for feet

Service Kits

DryFast® & DryFast Ultra® Diaphragm Vacuum Pumps

- One head service kit includes 1 diaphragm, valves and o-rings
- Two head service kit includes 2 diaphragms, valves and o-rings

Pump Model	No. Heads on Pump	KIT No.	Description
2014	1	2047K-01	One Head Service Kit
2032, 2042, 2047	2	2047K-01	One Head Service Kit
2032, 2042, 2047	2	2047K-02	Two Head Service Kit
2034, 2037, 2044	2	2037K-01	One Head Service Kit
2034, 2037, 2044	2	2037K-02	Two Head Service Kit
Tool Kit for Pump Models		**KIT No.**	**Description**
2014, 2032, 2034, 2037, 2042, 2044, 2047		826801-16	Wrench for diaphragm removal

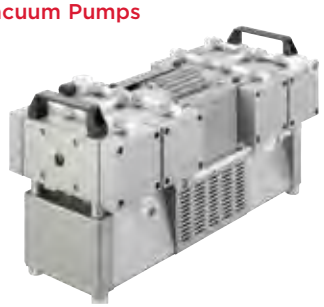
Self Cleaning Dry Vacuum System

- One head service kit includes 1 diaphragm, valves and o-rings
- Two head service kit includes 2 diaphragms, valves and o-rings

Pump Model	No. Heads on Pump	KIT No.	Description
2025	2	2037K-01	One head service kit
2025	2	2037K-02	Two head service Kit
2026, 2027, 2028	2	2047K-01	One head service kit
2026, 2027, 2028	2	2047K-02	Two head service kit
Tool Kit for Pump Models		**KIT No.**	**Description**
2025, 2026, 2027, 2028		826801-16	Wrench for diaphragm removal

High Flow Diaphragm Vacuum Pumps

- Service kit includes diaphrams, valves and o-rings.



Pump Model	KIT No.	Description
2054, 2052	402042-US	Four head service kit
2064, 2067, 2062, 2163	402043-US	Eight head service kit
Tool Kits for Pump Models	**KIT No.**	**Description**
2054, 2052, 2064, 2067, 2062	402106-US	Includes 19 mm wrench, Allen key and adjustable spanner wrench
2054, 2052, 2064, 2067, 2062	826801	Adjustable spanner wrench for diaphragm washer removal

Standard Duty Dry Piston Pump Kits

- Two head service kit includes 2 connecting rod assemblies, 2 valve plate assemblies, piston cups, muffler, gaskets and o-rings

Pump Model	KIT No.	Description
2580, 2585	2585K-03	Two Head Service Kit, 2585
	2585K-04	Seal Service Kit, 2585
2562, 2567	2567K-03	Two Head Service Kit, 2562/67
	2567K-04	Seal Service Kit, 2562/67
2561 Note[1]: Models older than and including Dec. 2007, date code 1207xxxx.	2561K-03	Two Head Service Kit, 2561
	2561K-04	Seal Service Kit, 2561
2561 Note[2]: Models newer than and including Jan 2008, date code 0108xxxx.	2563K-03	Two Head Service Kit, 2567 (Includes Seal Service Kit)
2563	2563K-03	Two Head Service Kit, 2563
2581	2581K-03	Two Head Service Kit, 2581
	2581K-04	Seal Service Kit, 2581
All Models WOB-L® Dry Pump	2500K-04	Service Kit for Feet

Standard Duty Dry Piston Pump Kits

- Rebuild kit includes connecting rod, o-rings, cylinder sleeve, piston cup, rubber suction feet and retainer screws

Pump Model	KIT No.	Description
2522	2522K-03	Complete Rebuild Kit
2534B-01	2534K-03	Complete Rebuild Kit
2534C-01, -02	2546K-03	Complete Rebuild Kit
2546	2546K-03	Complete Rebuild Kit
All Models WOB-L® Dry Pump	2500K-04	Service Kit for Feet

DuoSeal® Vacuum Pumps

- Minor repair kit includes shaft seal, intake screen, gaskets, springs, valves and spring holders
- Major repair kit includes everything in minor repair kit plus large and small metal vanes

Pump Model	KIT No.	Description
1400	1400K-03	Minor repair kit, 1400
	1400K-04	Major repair kit, 1400
1402, 1405	1402K-05	Minor repair kit, 1402 & 1405
	1402K-06	Major repair kit, 1402 & 1405
1376	1376K-05	Minor repair kit, 1376
	1376K-06	Major repair kit, 1376
1397, 1374	1397K-07	Minor repair kit, 1397 & 1374
	1397K-08	Major repair kit, 1397 & 1374
1399	1399K-03	Minor repair kit, 1399
	1399K-04	Major repair kit, 1399
1373	1373K-05	Minor repair kit, 1373
	1373K-06	Major repair kit, 1373

Chemstar® Vacuum Pumps

- Minor repair kit includes shaft seal, intake screen, gaskets, springs, valves and spring holders
- Major repair kit includes everything in minor repair kit plus large and small metal vanes

Pump Model	KIT No.	Description
1400N	1400K-09	Minor repair kit, ChemStar 1400N
	1400K-10	Major repair kit, ChemStar 1400N
1402N	1402K-09	Minor repair kit, ChemStar 1402N
	1402K-10	Major repair kit, ChemStar 1402N
1376N	1376K-09	Minor repair kit, ChemStar 1376N
	1376K-10	Major repair kit, ChemStar 1376N

CRVpro Vacuum Pumps

- Minor repair kit includes shaft seal, intake screen, gaskets, springs, valves and spring holders

Pump Model	KIT No.	Description
CRVpro 4	S3077-99	Repair Service Kit
CRVpro 6	S3078-99	Repair Service Kit
CRVpro 8	S3079-99	Repair Service Kit
CRVpro 16	S3193-99	Repair Service Kit
CRVpro 24	S3197-99	Repair Service Kit
CRVpro 30	S3198-99	Repair Service Kit
CRVpro 4/6/8	S3080-99	Seal Kit
CRVpro 4/6/8	S3091-99	Lip Seal Kit
CRVpro 16/24/30	S3192-99	Seal Kit
CRVpro 16/24/30	S3199-99	Lip Seal Kit

Service Kits

Compact Direct-Drive Vacuum Pumps

- Service Kit includes gaskets, o-rings, valves

Pump Model	KIT No.	Description
8890	8890K-02	Minor repair kit, 8890 with lip seal
8905	8905K-02	Minor repair kit, 8905
8905	8905K-03	Lip seal repair kit, 8905
8907, 8912, 8917	8917K-04	Minor repari kit 8907, 8912, 8917
	8917K-05	Shaft seal repair kit, 8917
8920	8920K-02	Minor repair kit 8920
8925	8925K-02	Minor repair kit 8925
8917A-80, 8917C-80	1420E-03	Replacement element oil sump

Chemvac Vacuum Pumps

- Service kit for diaphragm pump includes diaphragms, valves and o-rings
- Service kit for rotary vane pump includes shaft seal, o-rings, valves, springs, vanes and oil glass

Pump Model	KIT No.	Diaphragm Pump Repair Kit
6Z-101, 8960	302076-01	Rotary vane service kit
6Z-101, 8960	402008-01	Diaphragm service kit
12Z-301, 8965	302079-01	Rotary vane service kit
12Z-301, 8965	402041-02	Diaphragm service kit
23Z-301, 8970	302080-01	Rotary vane service kit
23Z-301, 8970	402041-02	Diaphragm service kit

MP/MPC Enclosed Diaphragm Pumps

- Service kit includes diaphragm, valves and O-Rings

Pump Model	KIT No.	Description
MP / MPR 060 E, 030 Z, biovac 060	402031	Two head service kit
MP / MPC 055Z, 105 E, biovac 106	402045	Two head service kit
MPC 105 T	402044	Four head service kit

MP/MPC Diaphragm Pumps

- Service kit includes diaphragm, valves and O-Rings

Pump Model	KIT No.	Description
MP / MPC 101 Z, 201 E	402008	Two head service kit
MP / MPC 201 T, MP 101 V	402015	Two head service kit
MP / MPC 301 E	402046	One head service kit
MP / MPC 301 Z, 601 E, 301 Z ef	402041	Two head service kit
MP / MPC 601 T, 901 Z, 1201 E, MP 301 V	402042	Four head service kit
Tool Kits for Pump Models	**KIT No.**	
MP/MPC 101, 201, 301, 601, 901, 1201, 1801, 2401	402106	Wrench, allen key and spanner
Adjustable spanner wrench for diaphragm washer	826801	Adjustable spanner wrench for diaphragm washer removal

Hold Back Pump (HBP) and MPC T Ex Diaphragm Pumps

- Service kit includes diaphragm, valves and O-Rings

Pump Model	KIT No.	Description
MPC 301 Zp Ex	402038	Two head service kit
MPC 601 Tp Ex	402039	Four head service kit
HBP 101	402035	Two head service kit

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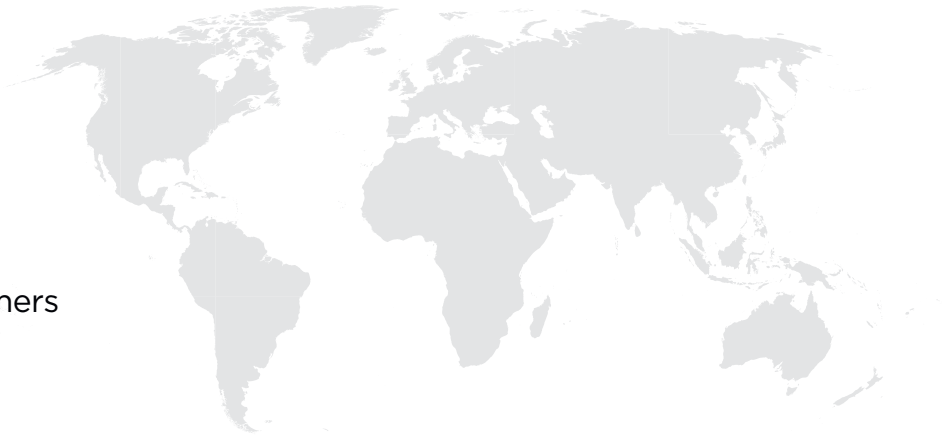

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Mail:
Gardner Denver Thomas Inc.
1601 Feehanville Drive, Suite 550
Mt. Prospect, IL 60056, USA
Payment Terms:
Net 30 days with approved credit; Mastercard, Visa or American Express are accepted for your convenience.

Minimum Order: $50.00

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To order your vacuum pumps, parts and accessories:

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E-mail: welch.na@gardnerdenver.com
Fax: 847-677-8606

Technical Assistance:
Call: (847) 676-8800
Fax: (847) 677-8606

Business Hours: 8:00 a.m. to 4:30 p.m. Central Time

WELCH REPAIR SERVICE

All Returns – Warranty and Non-Warranty
A Return Authorization (RA) number is required for all returns. Product returns without an RA will be refused at dock.

1. Go to www.welchvacuum.com to fill out and submit a Safety Service form online. This form lists chemicals that could be equipment contaminants and is required for the safety of repair personnel.
2. After reviewing your Safety Service form, the Welch Repair Department will provide you with the RA number and shipping instructions.
3. Decontaminate the equipment as needed and package properly. Damage caused by improper equipment packaging is the customer's responsibility. Insure the equipment against loss or damage. Prominently write the RA number on the outside of the packaging and again on the packing slip inside. Ship the equipment to the address provided by the Repair Department. Contact the Repair Department at 847-676-8800 with any questions you may have.

Non-Warranty Returns and Repairs
The Customer pays for freight charges to and from Welch; freight charges to Welch must be prepaid. In addition to an RA, all paid repairs must come with a purchase order (P.O.) or a credit card number. All paid repairs come with a 90 day warranty. A nominal fee is assessed for equipment that is inspected but not repaired at the customer's discretion.

Warranty Returns and Repairs
Freight charges to Welch are prepaid by the Customer; Welch pays for return freight charges.
For Repair Service Inquiry:
Email: gdwelchvacuum@gardnerdenver.com
Fax: 847-677-8606
Call: 847-676-8800
Business Hours: 8:00 a.m. to 4:30 p.m. Central Time

WARRANTY
This Welch product is warranted to be free from defects in material and workmanship. The liability of Gardner Denver Thomas, Inc. under this warranty is limited to servicing, adjusting, repairing or replacing any unit or component part which in the judgment of Gardner Denver Thomas, Inc. has not been misused, abused or altered in any way causing impaired performance or rendering it inoperative. No other warranties are expressed or implied. The method of executing this warranty: servicing, adjusting, repairing or replacing shall be at the discretion of Gardner Denver Thomas, Inc. Vacuum pumps that have been used for any period, however short, will be repaired under this warranty rather than replaced.

The warranty is effective for one year from the date of original purchase when:
1. The warranty card has been completed and returned.
2. The product is returned to the factory or other designated service centers, freight prepaid.
3. The product in our judgment is defective through no action or fault of the user.

If the product has become defective through misuse, abuse, or alteration, repairs will be billed regardless of the age of the product. In this event, an estimate of the repair costs will be submitted and authorization of these charges will be required before the product is repaired and returned. To reduce additional charges and delays either within or outside of the warranty period, contact Welch at (847) 676-8800 for a return authorization number. Products without a return authorization number will be refused by our receiving department. Before shipping, properly pack the pump, insure it against loss or damage, and on the outside of the pump packaging and the packing slip write in the return authorization number. Pumps damaged due to improper packaging are the customer's responsibility.

For Complete Welch Terms and Conditions see: www.welchvacuum.com

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