

# Welch® Applied Vacuum Technology for the Laboratory

*Application Specific Pumps*

*Dry (oil-free) Vacuum Pumps*

*High Vacuum Rotary Vane Pumps*

*Components, Traps & Gauges*



**WELCH**  
A Gardner Denver Product

# Laboratory Vacuum Catalog

The business of Welch Vacuum Technology is providing you with products and expertise to address your application needs. As a business unit of Gardner Denver Thomas, Inc., Welch has the engineering and manufacturing capability to provide the industry's most comprehensive line of laboratory pumps. We are proud to introduce many new, innovative products in this Catalog.

With over 100 years serving the Laboratory marketplace, Welch has developed in-depth understandings of your applications and technical solutions to precisely address your needs. The benefits of a Welch Application Specific Pump begin with our green-by-design engineering and extend throughout the life of your application – all at an affordable price. To learn more about our Application Specific pumps, please see pages 5 to 21 of this Catalog or visit our web site at [www.welchvacuum.com](http://www.welchvacuum.com).

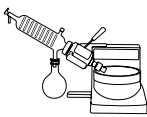

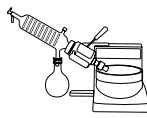



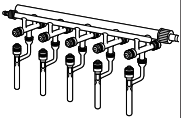

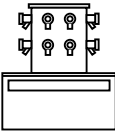

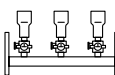





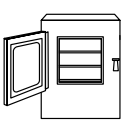



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See our online catalog for additional information, U.S.A. list prices, and repair part information.

[www.welchvacuum.com](http://www.welchvacuum.com)

# Pump Selection Chart

## For Common Lab Applications

Application	Welch Vacuum Pumps & Systems	Flow Rate x Vacuum	Unit Photo	Model	See Page
<b>Rotovap</b> Volatiles, Low B.P. B.P. <100°C Samples 0-5 Liter 	<b>"Rotovap System"</b> DRYFAST® System with regulator, gauge, condensate jars, self-cleaning auto-purge	35 L/min. 9 Torr (12 mbar)		202501	6-9
<b>Rotovap</b> DMF, Toluene, other non-volatiles Samples 0-5 Liter 	<b>"High Boiler System"</b> DRYFAST ULTRA® System & Pump	35 L/min. 2 Torr (2.7 mbar)  35 L/min. 2 Torr (2.7 mbar)		202801  2042B-01	6-9
<b>Concentrator</b> Samples <2ml x 24, DNA Pelleting 	<b>"Concentrator Pump"</b> DRYFAST ULTRA Pump  DRYFAST ULTRA SYSTEM Compatible with: SpeedVac® & CentriVac®	35 L/min. 2 Torr (2.7 mbar)  35 L/min. 9 Torr (12 mbar)		2042B-01  2044B-01 202501	10  10 19
<b>Vacuum Manifold</b> Schlenk Line 	<b>"Vacuum Manifold Pump"</b> DUOSEAL® & CHEMSTAR® Pumps  GEM® System	25 L/min. <1 millitorr (1.3x10 <sup>-3</sup> mbar)  100 millitorr (0.13 mbar)		1400B-01 or 1400N-01  8890A-70	12, 13
<b>Freeze Dryer</b> 	<b>"Freeze Dryer Pump"</b> Direct Drive pump w/integral oil filtration system  CHEMSTAR Low RPM Pump	173 L/min.  160 L/min.		8917A-80  1402N-01	15
<b>Filtration</b> 	<b>"Filtration Pump"</b> Chemical Duty  Standard Duty	22 L/min.  22 L/min.		2012B-01  2522B-01	11
<b>Aspiration/Automation</b> Cell Harvester Plate Washer 	<b>"Aspiration System"</b> Standard Duty  Chemical Duty	88 L/min. 27.6 in. Hg (80 mbar)  70 L/min. 28.5 in. Hg (47 mbar)	 (80 mbar)	2567B-70  2047B-01	18
<b>Cell Culture</b> Aspiration 	<b>"Cell Culture Station"</b> With gauge, regulator, 1200 ml autoclaveable trap with liquid blockade system	34 L/min. 27.2 in. Hg (93 mbar)		2515B-75	16, 17
<b>Vacuum Oven</b> Drying Degassing 	<b>"Vacuum Drying Pump"</b> Standard Duty Dry  Chemical Duty Dry  DUOSEAL	100 L/min.  70 L/min.  160 L/min		2581B-50  2047B-01  1402B-01	14
<b>Gel Dryer</b> 	<b>"GELMASTER™ System"</b> Complete Gel Drying Vacuum System with hose, valve	>50 L/min. of Vapor @ 28 in. Hg		142601	19

## Tune-able Vacuum PTFE Dry Pumps



Models 2034, 2044,  
2037, 2047



Models 2032, 2042

- Advanced design dry vacuum pumps
- Built-in vacuum adjustment for “tune-able” vacuum optimization
- 2 Torr (2.7 mbar) models strip DMF fast at 35° C  
9 Torr (12 mbar) models strip most common solvents fast
- Corrosion resistant, chemical duty, oil-free diaphragm pumps
- Ideal for rotovaps, concentrators, vacuum ovens

For Specifications & Ordering Information, See p. 22

### All New DRYFAST® and DRYFAST ULTRA® PTFE Vacuum Pumps

DRYFAST and DRYFAST ULTRA vacuum pumps are a major departure from previous PTFE dry pump capabilities. Adjustable vacuum is standard with all models allowing the pump’s vacuum to be tuned or optimized for the task at hand. Ultimate vacuum levels range from 2 Torr (2.7 mbar) to 35 Torr (47 mbar) for the highest flow unit. Maximum flows from 25 to 70 L/min (21 to 58 L/min at 50Hz) serve a wide variety of laboratory needs. DRYFAST and DRYFAST ULTRA pumps are suitable for rotary evaporators, vacuum concentrators, vacuum ovens, distillation, filtration, and other applications for pumping aggressive vapors and gases.

.... Drive maximum evaporation without bumping or foaming in sensitive operations. *Tune-able vacuum* allows for visual vacuum adjustment to optimize evaporation rates for rotary evaporation. *Tune-able vacuum* also allows adjustment to optimum vacuum for distillation, vacuum concentration, and other vacuum sensitive techniques.

.... 2 Torr (2.7 mbar) models achieve *fast evaporation for DMF* and other high boiling point solvents at low bath temperatures.

.... Constructed with solid PTFE heads, PTFE diaphragms, Kalrez® valves and fluorinated plastics at all wetted surfaces. These corrosion resistant vacuum pumps *handle aggressive vapors*. DRYFAST and DRYFAST ULTRA vacuum pumps *with no oil changes* save time, mess, and money.

### A Broad Range of Vacuum and Flow Levels for a Broad Range of Laboratory Applications

Pump Model No.	High Vacuum		General Purpose		High Flow	
	2032	2042	2034	2044	2037	2047
Free Air Displacement						
CFM (L/min) @ 60Hz	0.9(25)	1.2(35)	0.9(25)	1.2(35)	1.8(50)	2.5(70)
m <sup>3</sup> /hr (L/min) @ 50Hz	1.25(21)	1.75(29)	1.25(21)	1.75(29)	2.5(42)	3.5(58)
Ultimate Pressure, Torr (mbar)	2(2.7)	2(2.7)	9(12)	9(12)	50(67)	35(47)
Wired for 115V, 60Hz, 1Ph with N. American 115V plug	2032B-01	2042B-01	2034B-01	2044B-01	2037B-01	2047B-01
Wired for 230V, 50/60Hz, 1Ph, IEC Cord with Continental Euro. (Schuko) plug	2032C-02	2042C-02	2034C-02	2044C-02	2037C-02	2047C-02
Wired for 100V, 50/60Hz for Japan	2032C-05	2042C-05	2034C-05	2044C-05	2037C-05	2047C-05



# Walk away Automation



- Compact, all in one PTFE pump, programmable controller and liquid traps
- 2 Torr/2.7 mbar for fast stripping of DMF
- Intuitive, flexible operation and programming
- Self-Cleaning and patent pending vacuum control for long diaphragm life and stable vacuum
- Quiet, low vibration



Model 2028



## Model 2028 Programmable Self-Cleaning Dry Vacuum System™

We've taken the popular Welch Self-Cleaning Dry Vacuum System, a laboratory workhorse, and added full user programmability and 2Torr/2.7 mbar DMF stripping capability. Enter the parameters via the keyboard or call up one of the stored programs and *walk away*. Model 2028 takes over and completes your rotary evaporation, distillation, or other evaporation procedure.

- .... **Five user stored programs** with one or two vacuum setpoints and evaporation times.
- .... Enter the desired vacuum with the numeric keypad or find the optimum vacuum with the easy to use electronic vacuum adjustment dial.
- .... One-touch function keys stop **bumping/foaming**, go quickly to **maximum vacuum**, or **vent** to atmosphere.

For Specifications & Ordering Information, See p. 23

## Welch Self-Cleaning Dry Vacuum Systems – Model 2025, Model 2027, and Model 2028

Features of all Self-Cleaning models: • Complete vacuum system for evaporation • Corrosion resistant PTFE pump body & diaphragms, fluoroplastic valves and wetted surfaces • Continuously adjustable vacuum regulator or controller • Vacuum read-out • Inlet and outlet liquid traps • Anti-bumping/foaming feature • Automatic Self-Cleaning purge at shutdown

Welch Model	2025	2027	2028
Free Air Displacement			
CFM (L/min) @ 60Hz	1.2(35)	1.2(35)	1.2(35)
m <sup>3</sup> /hr (L/min) @ 50Hz	1.7(28)	1.7(28)	1.7(28)
Ultimate Pressure, Torr (mbar)	9(12)	2(2.7)	2(2.7)
Wired for 115V, 60Hz, 1Ph with N. American 115V plug	202501	202701	202801
Wired for 230V, 50Hz, 1Ph, IEC Cord with Continental Euro. (Schuko) plug	202503	202703	202803
Wired for 100V, 50/60Hz for Japan	202505	202705	202805



Model 2025



Model 2027

# GEMINI Dry Vacuum Pumps



Model 2050



Model 2060

- Economical pumps with advanced chemical resistance
- Ideal for many organic filtration /degassing applications
- High performance wetted components will not corrode
- Convenient for lab or field usage

## All New GEMINI Dry Pumps<sup>1</sup>

Take the next step up from standard duty vacuum pumps for aqueous applications. Versatile GEMINI dry vacuum pumps can also tolerate fumes from select solvents and moderate pH acids and bases. Quiet, lightweight GEMINI pumps provide a portable, oil-less solution for many laboratory and field vacuum needs, including filtration, aspiration, degassing, and desiccation.

GEMINI wetted components are chemically resistant - polyarylamide heads and Viton® diaphragms, tubing, and valves. GEMINI pumps can be used in the lab using the AC/DC adapter (included) or in the field using an optional DC car adapter (Order 1431B). Model 2060 includes a vacuum regulator and dial vacuum gauge for fine vacuum level adjustment.

**Note:**

1. Not recommended for use with strongly acidic or basic fumes. For organic fume applications, check for chemical compatibility with Viton®. Not recommended for rotary evaporator, concentrator, or vacuum oven applications. See PTFE dry vacuum pumps and systems(p. 22 & 23) for applications requiring higher vacuum / flow with harsh or aggressive chemicals.

Specifications	2050	2060
<b>Welch Model</b>		
Free Air Displacement		
CFM(L/min)	0.3(8.5)	0.46(13)
Ultimate Pressure, Torr(mbar)	190(253)	200(266)
Vacuum Regulator and Gauge	No	Yes
Max Vacuum, in. Hg	22.4	22.0
Inlet thread NPT	—	1/8
Tubing, I.D. in.(mm)	3/8(10)	3/8(10)
Weight, lbs.(kg)	5.3	11
Dimensions LxWxH, in.	7.6x4.5x7.5	9.25x7.25x8.5
cm	19.4x11.4x19.1	23.5x18.4x21.6
Shipping weight, lbs.(kg)	7(3.2)	13(5.9)
<b>Ordering Information</b>		
Pump w/115V, 60Hz, 1 Ph power adapter with N. American 115V Plug	2050B-01	2060B-01
Pump w/230V, 50Hz, 1 Ph power adapter with cont. Euro.(Schuko) Plug	2050C-02	2060C-02

Available  
Q2, 2007

# Applied Vacuum Technology Introduction

## Five Key Advantages of Application Specific Pumps & Systems

The business of Welch is providing laboratory vacuum users with the best possible technical solutions. To more completely serve your needs, Welch has developed application specific products. Our advanced pump designs, quality manufacturing, and applications expertise provide you with:

- **Most cost effective vacuum solution**
  - Increases user productivity
  - Saves time in set-up and operation
- **Health and safety considerations built into design**
  - Lowers hazardous waste generation
  - Improves safety
- **Correct pumping technology extends service interval**
  - Reduces downtime
  - Lowers maintenance costs
- **Necessary pump accessories & instructions supplied**
  - Eliminates searching for correct accessories
  - Insures proper operation procedures
- **Application certified vacuum solution**
  - Provides peace of mind in the selection of the correct pump
  - Place to go for assistance

<b>Application Specific Pumps &amp; Vacuum Systems</b>	<b>Page</b>
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See our online catalog for additional information:  
[www.welchvacuum.com](http://www.welchvacuum.com)

### Put Welch Laboratory Vacuum Expertise to Work for You

Welch's cornerstone of success is providing the best possible vacuum solution for laboratory applications. We are able to offer the best possible solution because we have the widest range of application specific laboratory vacuum pumps available anywhere. Your local Welch Technical Representative can help you choose the vacuum products to optimize the performance and reliability of your vacuum systems. Benefit from Welch's services:

#### Site Audit

Welch will analyze your vacuum usages and make recommendations based upon the best possible solution.

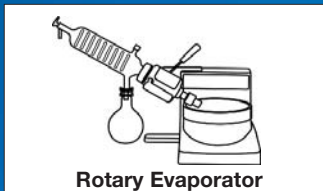
#### Pump Selection / Configuration

Your Welch Technical Sales Rep will work with you to assure the right pump choice and an installation that protects your Application and your investment.

#### Applications Support

Contact Welch for on-going advice to make your vacuum systems work smoothly.

Contact Welch Technical Service at 847-676-8819 or e-mail [welchvacuum@rtpumps.com](mailto:welchvacuum@rtpumps.com)



# Applied Vacuum Technology for Rotary Evaporators

## THE WELCH SELF-CLEANING FAMILY . . . COMPLETE VACUUM SYSTEMS FOR ROTARY EVAPORATORS



- Anti-bumping/foaming feature with controlled evaporation rate
- Rugged corrosion resistant PTFE construction
- Self-cleaning for long life
- 2 Torr (2.7 mbar) models strip DMF at 35°C bath temperature  
9 Torr models (12 mbar) models strip most common solvents
- Programmable 2028 features *walk away* automation

For Specifications & Ordering Information, See p. 22, 23

### SELF-CLEANING DRY VACUUM SYSTEMS™ FOR ROTARY EVAPORATORS

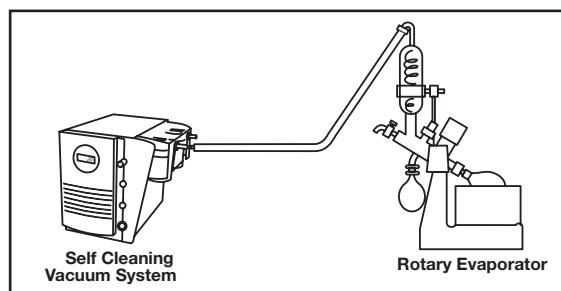
are complete vacuum solutions for rotary evaporation. All three systems feature rugged corrosion resistant PTFE diaphragm pumps for *low maintenance and long life*. All models feature adjustable vacuum to *optimize for a variety of solvents*. Also included with all models: digital or analog vacuum read-out, inlet and outlet traps to protect the pump and exhaust line from liquids, gas ballast or no bumping/foaming key as an *emergency "bump stop"*, and automatic *self-cleaning purge* at shutdown. The self-cleaning feature and patent pending vacuum control technology contribute to Self Cleaning pumps' *long diaphragm life*. All models are 35 L/min at 60 Hz (29 L/min at 50Hz).

**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 ultimate vacuum for fast stripping of 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 2025** general usage meter vacuum read-out, vacuum regulator, 9 Torr ultimate vacuum for fast stripping of most common rotary evaporation solvents. Fast stripping of rotary evaporator solvents with boiling point < 100°C.

**MODEL SELECTOR, on page 8**  
...Welch pump models recommended for selected rotary evaporation solvents



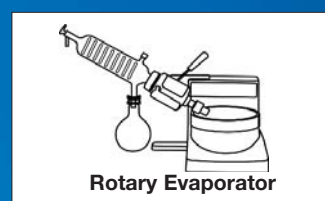
Typical Configuration

**Green By Design**

CAPTURE™ vapor emissions from rotary evaporators with an integrated solvent recovery system - see page 9.



# Applied Vacuum Technology for Rotary Evaporators



## WELCH DRYFAST® VACUUM PUMPS . . . POWERFUL FEATURES FOR ROTARY EVAPORATORS



2034, 2044



2032, 2042

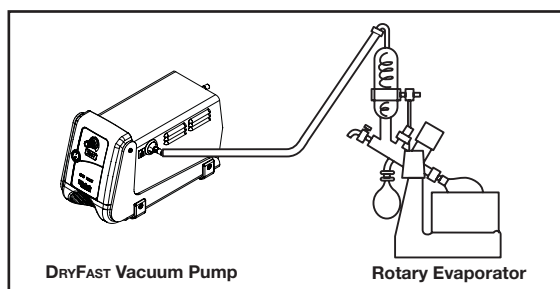
- Powerful vacuum pumps for rotary evaporators
- Adjustable vacuum to control evaporation rate
- 2 Torr (2.7 mbar) models strip DMF fast at 35°C  
9 Torr (12 mbar) models strip most common solvents
- Rugged chemical duty PTFE and fluorinated plastic construction
- Replaces oil pumps prone to solvent-induced failure

For Specifications & Ordering Information, See p. 22, 23

**PTFE DRY VACUUM PUMPS FOR ROTARY EVAPORATORS** include essential features to assure successful rotary evaporation. The DRYFAST tune-able vacuum adjustment allows the user to *optimize the vacuum for the solvent* to be evaporated. Optimization can be accomplished by adjusting to deeper vacuum until bubbles form in the evaporation flask, then backing off slightly. The tune-able vacuum adjustment can also be used to stop accidental bumping/foaming. DRYFAST models offer 9 Torr (12 mbar) vacuum to strip common solvents fast, 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 vacuum control technology contributes to *long diaphragm life*. 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	Max. Vacuum Torr (mbar)	Max. Pumping Speed (L/min)		Evaporator Conditions			
			60 Hz	50 Hz	Boiling Pt.		Flask Size	
					<110°C	<160°C	Standard	Large
DRYFAST	2034	9(12)	25	21	✓		✓	
	2044	9(12)	35	29	✓		✓	✓
DRYFAST ULTRA	2032	2(2.7)	25	21	✓	✓	✓	
	2042	2(2.7)	35	29	✓	✓	✓	✓

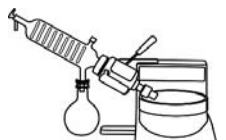
### MODEL SELECTOR, on page 8 ...Welch pump model recommendations for selected rotary evaporation solvents



Typical Configuration

**Green By Design**

CAPTURE™ vapor emissions from rotary evaporators with an integrated solvent recovery system - see page 9.



Rotary Evaporator

# Applied Vacuum Technology for Rotary Evaporators

## ROTARY EVAPORATION PUMP FOR LOW BOILING POINT SOLVENTS



2012

- Effective evaporation for acetone, methylene chloride, etc.
- Corrosion resistant PTFE dry pump
- Most economical Welch PTFE dry pump for rotary evaporation use

**MODEL 2012** is effective for rotary evaporation of *low boiling point solvents* such as acetone and methylene chloride. Model 2012 is the most *economical* Welch dry pump suitable for rotary evaporation. The rugged, *low maintenance, low repair* dry pump features PTFE heads, Kalrez® valves and fluorinated plastic at all wetted surfaces.

Model 2012 has the chemical resistance to *handle aggressive vapors*.

For Specifications & Ordering Information, See p. 22

## ROTARY EVAPORATION PUMP FOR VERY HIGH BOILING POINT SOLVENTS



8890A-70

- Effective evaporation for DMSO and other very high boiling point solvents
- Adjustable vacuum to prevent bumping
- Gear pump mechanism is tolerant of vapors
- Exhaust mist eliminator prevents oil loss

The **GEM® MODEL 8890A-70 VACUUM SYSTEM** is ideal for rotary evaporations with *very high boiling point solvents*. The *rugged gear pumping mechanism* has a wide range of operating pressures. It has high efficiency for pumping vapors without condensing them into the pump. 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.

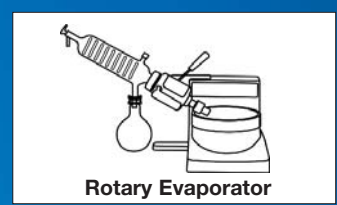
For Specifications & Ordering Information, See p. 27

### MODEL SELECTOR

... Welch pump models recommended for selected rotary evaporation solvents

Solvent	Methylene chloride Acetone Chloroform Methanol	Trichloroethylene n-Propylalcohol Heptane Water Toluene Acetic Acid	1,1,2,2-Tetrachloroethane DMF Pentachloroethane	DMSO Polymers
Boiling Pt.	50°C	100°C	160°C	195°C
Recommended Models	→ 2012	→ 2025 2044 2034	→ 2028 2027 2042 2032	→ 8890A-70 1400

# Applied Vacuum Technology for Rotovap Vapor Recovery



## CAPTURE VAPOR RECOVERY SYSTEM . . . COMPLETE YOUR VACUUM SYSTEM FOR ROTARY EVAPORATORS

*Green  
By Design*



DRYFAST® and DRYFAST ULTRA®



**New**



Self-Cleaning  
Dry Vacuum System™

- Protects lab air quality
- Enables Cradle-to-Grave chemical handling
- Spatially efficient, easy to setup/clean-up

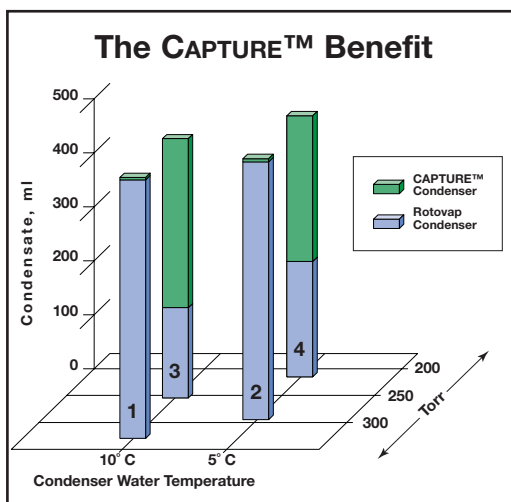


Figure 1: Methylene Chloride distillation, 500ml

Evaporating a solvent under less-than-ideal conditions? Now you can overcome evaporator setup and condenser cooling limitations to minimize vacuum pump solvent emissions. *The Welch CAPTURE™ vapor recovery system can improve total solvent emission recovery efficiency to near 99%*. The CAPTURE option is a highly efficient condenser and mounting system, cooled by tap or chilled water.

Even under good distillation conditions, volatile solvent vapors can be emitted from your vacuum pump. With stressed conditions, a high percentage of solvent vapors can be pulled through your vacuum pump - and discharged into the atmosphere. Use CAPTURE to maintain excellent solvent recovery for the most difficult distillations.

Figure 1 illustrates the importance of using a CAPTURE recovery system. Using a 35° C water bath and constant rotational speed, methylene chloride is distilled using two temperatures of cooling water for both the rotovap and CAPTURE condensers. The lower the condenser operating temperature, the more efficient the collection.

**At properly moderated vacuum levels** (Bars 1 and 2), the rotovap condenser contains a high portion of the condensate.

**At full vacuum** (Bars 3 & 4), vapors are pulled through the vacuum pump and released into the atmosphere - unless you use a CAPTURE recovery system!

### Ordering Information

Description	Cat. No.
Includes condenser, 1L round bottom flask, tubing, support and clamps.	1420H-18

### Application Note: Operating Solvent Emission Recovery Systems Effectively

#### More Vacuum is NOT always Better Vacuum

Good emission control begins with proper balance of your vacuum application. If vapors are pulled through a foreline trap faster than they can condense, the downstream necessity for additional trapping is increased. Proper use of Tune-able pumps like the DRYFAST, DRYFAST ULTRA, and Self-Cleaning Dry Vacuum Systems will enable precise vacuum control and reduce emission potential. Rotary evaporation applications should always operate at vacuum levels below “bumping” potential. Use mass balance to verify that your cold trap is actually capturing all solvents / solids – not passing it through to the pump.



Concentrator

# Applied Vacuum Technology for Centrifugal Concentrators

## DNA PELLETING



2044

- Recommended for SpeedVac® and CentriVac® centrifugal concentrators
- Fast evaporation for ethanol and water
- Low maintenance – no oil changes
- Reliable chemical duty PTFE pump

DRYFAST® PUMP FOR VACUUM CONCENTRATORS is effective for DNA pelleting. DNA pelleting *drying times are equivalent to oil-seal pumps* without the oil changes, frequent repairs, and oil mess. Recommended for most centrifugal concentrators including Savant SpeedVac® and Labconco CentriVac®. Replace leaking, smoking oil-seal pumps with *low maintenance, low repair* PTFE dry pumps.

For Specifications & Ordering Information, See p. 22

## OLIGONUCLEOTIDE PREP, BIOCHEMICAL/ORGANIC SAMPLES, LARGE SAMPLE VOLUME



2042

- Recommended for SpeedVac® and CentriVac® centrifugal concentrators
- Fast evaporation when used with a -50° C refrigerated trap
- Low maintenance – no oil changes
- Reliable chemical duty PTFE pump

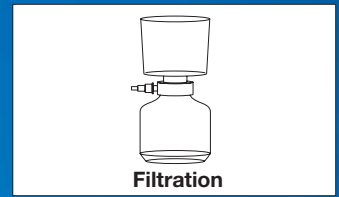
DRYFAST® Ultra DRY PUMP FOR VACUUM CONCENTRATORS is effective for oligonucleotide prep, biochemical and organic samples and large sample volumes when paired with a -50°C refrigerated trap. With this recommended configuration *drying times are equivalent to those of oil-seal pumps*. The PTFE dry pump eliminates oil changes, frequent repairs, and oil mess. Recommended for most centrifugal concentrators including Savant SpeedVac® and Labconco CentriVac®. Replace leaking, smoking oil-seal pumps with *low maintenance, low repair* dry pumps. DRYFAST pumps have the chemical resistance to *handle aggressive chemicals* such as TFA, HCl, formic acid, and acetic acid.

### MODEL SELECTOR ...For Centrifugal Concentrator Pumps & Traps

DNA Pelleting (<1ml, 50/50 water/ethanol, up to 24 tubes/run)	Refrigerated trap optional	Welch 2044B-01, 9 Torr (12 mbar)
Oligonucleotide Preps (2-4 ml, buffers, up to 60 tubes/run)	-55°C Refrigerated trap highly recommended	Welch 2042B-01, 2 Torr (2.7 mbar) Cold trap helps speed evaporation
Biochemical/Organic Samples up to 5 ml x 60 tubes	-55°C Refrigerated trap required	Welch 2042B-01, 2 Torr
Biochemical or large samples up to 50ml/tube	-55°C Refrigerated trap required	Welch 2042B-01, 2 Torr



# Applied Vacuum Technology for Filtration



## AQUEOUS SOLUTIONS



2522

- Ideal for filtering aqueous solutions/buffers
- Vacuum or pressure filtration
- Full featured for filtration
- Attractively priced

## ACIDIC OR BASIC SOLUTIONS, ORGANIC SOLVENTS



2012

- Recommended for filtering acidic or basic solutions and organic solvents.
- Rugged corrosion-resistant PTFE construction
- Oil-free - no oil changes, no oil mess
- Compact, lightweight, portable

### STANDARD DUTY DRY PISTON PUMPS FOR VACUUM FILTRATION

are *effective for filtering aqueous solutions* that are not strongly acidic or basic. These *attractively priced* pumps are *oil-free* and loaded with *powerful features* for filtration; vacuum and pressure adjustments with gauges, liquid traps at inlet & outlet, liquid shutoff at inlet, and noise reduction.

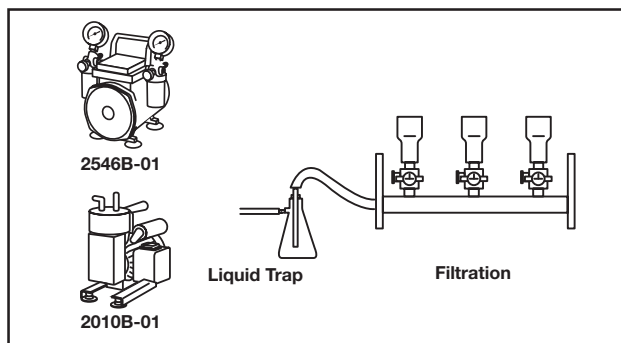
Five models power filtration *setups of 1 to 6 funnels and larger.*

For Specifications & Ordering Information, See p. 24

### CHEMICAL DUTY DRY PUMPS FOR VACUUM FILTRATION

are *effective for filtering acidic or basic solutions and organic solvents.* These rugged *oil-free* pumps are *corrosion resistant* with all fluoroplastic materials at wetted surfaces. Four models power filtration *setups of 1 to 6 funnels and larger.*

For Specifications & Ordering Information, See p. 22



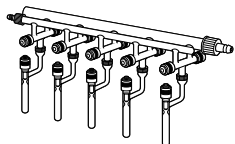
Typical Configuration



Also see Water-Jet aspirator p. 32

## MODEL SELECTOR ... For Filtration Pumps

Filtration Funnels	Aqueous Solutions	Acid/Base/Solvent
1	2522B-01	2010B-01
1-2	2522B-01	2012B-01
1-4	2534B-01	2037B-01
1-6	2546B-01	2037B-01
6 Funnel manifold	2567B-50	2047B-01



Vacuum Manifold

# Applied Vacuum Technology for Vacuum Manifolds (Schlenk Line)

## COMPACT VACUUM MANIFOLD PUMP



8890A-70

- “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 (31L/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. It also includes 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<sup>1</sup>. GEM 8890A-70 works effectively with 1440H-01 Ultra-Low refrigerated Cold Trap. (see page 39 for details)

1. See Application Note: Vacuum Manifolds

For Specifications & Ordering Information, See p. 27

## MOST DURABLE VACUUM MANIFOLD PUMP



1400/1400N

- 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 catalog number 1417 or 1416D.

For Specifications & Ordering Information, See p. 28, 30

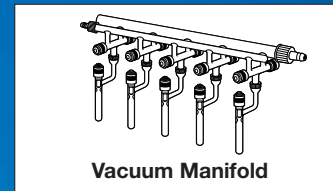
1. See Application Note (Vacuum Manifolds): “Recommended pump capacity”.

### 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 page 13) 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 recondensing in the pump.

The use of large capacity pumps (greater than 40 L/min) on vacuum manifolds shorten the oil change interval. This occurs because the larger pump will accelerate the sublimation process. 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.

# Applied Vacuum Technology for Vacuum Manifolds (Schlenk Line)



## REFRIGERATED TRAP ULTRA COLD (-100°C)<sup>1</sup>

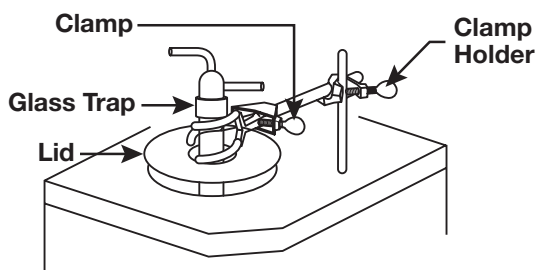
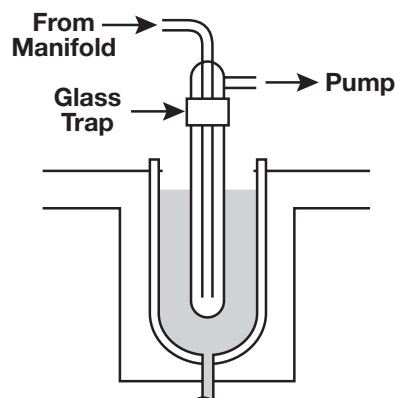


- Saves the cost of recharging dry ice/LN2 trap
- Reduces the risk of pump failure caused by neglect of recharging dry ice/LN2 trap
- Protects oil-sealed pump from organic vapors

**ULTRA-LOW REFRIGERATED COLD TRAP** is an effective foreline cold trap for vacuum manifolds<sup>1</sup> or Schlenk Lines. The refrigerated trap eliminates the need to continually recharge cold traps with dry ice or liquid nitrogen. This saves valuable operator time and helps **eliminate pump damage caused by failure to recharge a cold trap** with dry ice / isopropanol or liquid nitrogen. More effective trapping means less downtime and fewer expensive repairs. The refrigerated trap may be more economical to operate over time, as it saves the cost of expensive dry ice and liquid nitrogen.

**Notes:**

1. Ambient temperature at 23° C & no vapor load.
2. Support/clamp set for glass trap; also order cat. no. 1420H-21. See page 39.



## DRY ICE/ISOPROPANOL TRAP (-79°C)



- Recommended for vacuum manifold (Schlenk Line) use
- Uses dry ice or liquid nitrogen as refrigerant
- Removable center make trapping surface easy to clean

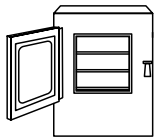
**DRY ICE/LIQUID NITROGEN COLD TRAP** is an effective foreline cold trap for vacuum manifolds or Schlenk Lines. The trap has a large 3 quart (2.8 L) center well for the dry ice/isopropyl alcohol slurry or liquid nitrogen. The transparent ring allows **visual monitoring** of the trapping surface without breaking the vacuum while the system is operating. 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. See Applications Notes, p. 12 & 13 for configuration and usage information.

For Specifications & Ordering Information, See p. 38, 39

### Application Note: Vacuum Manifold Cold Traps – Setup and Operation

**Refrigerated Cold Trap** – Add ethanol to the stainless steel well and position the vacuum joint glass trap in the center of the well. Then, use good quality vacuum hose to plumb the vacuum joint glass trap between the manifold and the vacuum pump. The vacuum pump can be positioned close to the well, typically on the retaining shelf on top of the refrigeration unit. The ethanol reaches maximum trapping efficiency at -100°C in about one hour. Clean the trapping surface regularly to avoid ice buildup that insulates the trapping surface making it less efficient for trapping.

**Dry Ice Cold Trap** – Add isopropyl alcohol to the center well (Do not use acetone). Carefully add dry ice one piece at a time to avoid spattering. Position the vacuum joint glass trap to the center of the well. Then, use good quality vacuum hose to plumb the vacuum joint glass trap between the manifold and the vacuum pump. Clean the trapping surface regularly to avoid ice buildup that insulates the trapping surface making it less efficient for trapping. **Liquid Nitrogen** – Same as Dry Ice except liquid nitrogen is added to the center well instead of dry ice and isopropyl alcohol.



Vacuum Oven

# Applied Vacuum Technology for Vacuum Ovens

## AQUEOUS SAMPLES



2561

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

STANDARD DRY PISTON PUMPS FOR VACUUM OVENS are *effective for drying aqueous samples* that are not strongly acidic or basic. These vacuum pumps were developed and tested for selected vacuum applications such as drying precipitates, food and soil samples, and glassware. 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*. The pumps include a *liquid trap* at the inlet, *vacuum adjustment*, and *gauge*. Supplemental inlet cold traps are recommended for high water vapor loads.

For Specifications & Ordering Information, See p. 24

## ACIDIC OR BASIC SAMPLES, ORGANIC SOLVENTS



2042, 2047

- Fast drying for vacuum oven samples
- Oil-free - no oil changes, no oil mess
- Rugged corrosion-resistant PTFE construction
- Compact, lightweight, portable

DryFast PTFE DRY PUMPS FOR VACUUM OVENS are *effective for drying samples that are strongly acidic or basic*. DRYFAST pumps are also effective for samples containing organic solvents. These vacuum pumps are recommended for work with corrosive fumes and the fluorinated contact surfaces are resistant to organic attack. 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*. The pumps have *tune-able vacuum* adjustment knobs.

Cold traps are recommended for high vapor loads. See CAPTURE™ recovery system, page 23.

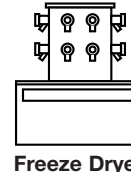
For Specifications & Ordering Information, See p. 22

## MODEL SELECTOR ...For Vacuum Ovens

Vacuum Oven Size	Aqueous Samples	Acidic/basic/organic samples
Less than 2 ft <sup>3</sup> (57L)	2561	2042
2 to 4.5 ft <sup>3</sup> (57 to 127L)	2581	2047



# Applied Vacuum Technology for Freeze Dryers



Freeze Dryer

## EXTENDED SERVICE INTERVAL IN A COMPACT PUMP



8917A-80

- 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 at 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 Oil (see page 43) which has excellent resistance to chemical attack.

For Specifications &  
Ordering Information,  
See p. 27

## RUGGED PUMP FOR CORROSIVE VAPORS



1402N

- 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 L 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 (see page 43) which has excellent resistance to chemical attack.

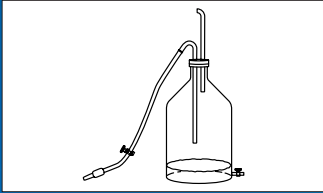
For Specifications &  
Ordering Information,  
See p. 28

### Application Note: Freeze Drying

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 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 colder.



# Applied Vacuum Technology for Cell Culture

## COMPACT STATION FOR ASPIRATION & PRESSURE TRANSFER



2511

- Pumping capacity 11 L/min @60Hz
- Pressure transfer capability to 33 PSIG(3.3 x 10<sup>5</sup> Pascal)
- Automatic flow stop when 1.2L 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 1.2L autoclaveable, bleach resistant collection receiver, vacuum regulator & gauge, hydrophobic inline filter, automatic shutoff and vacuum regulator to simplify use. 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 page 17 for hand held pipettor and other aspiration accessories.

For Specifications & Ordering Information, See p. 25

## HIGH FLOW FOR CELL CULTURE ASPIRATION



2515

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

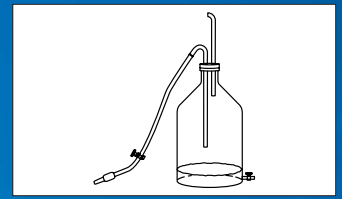
**HIGH FLOW MODEL 2515** standard duty, oil free station. is an economical, portable solution for aspirating or filtering. Added accessories include 1.2L autoclaveable, bleach resistant collection receiver, vacuum regulator & gauge, hydrophobic inline filter, automatic shutoff and vacuum regulator to simplify use. 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 page 17 for hand held pipettor and other aspiration accessories.

For Specifications & Ordering Information, See p. 25

### 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 liquids and automatically shuts down the pump when full and 2). the hydrophobic inline filter further protects the pump from aerosol ingestion. Routinely empty the Collection Receiver to assure continuous aspiration for your application.

# Applied Vacuum Technology for Cell Culture



## HAND HELD PIPETTOR FOR ASPIRATION STATIONS



1475K-10

- Quick pipette/manifold adaptation
- Precise vacuum control button
- Ergonomic design lessens strain
- Solution contact surfaces autoclaveable

### CONTROL YOUR ASPIRATION APPLICATION WITH EASE.

The handheld pipettor system (1475K-10) provides pressure sensitive button control and enables quick conversion for aspiration from a variety of vessel formats. An adjustment screw allows you to set the right residual suction to prevent drippage during pipette use; closing the adjustment screw stops all residual vacuum. Single channel and four and eight channel stainless steel manifold adapters work well with a wide range of liquid media. The single and eight channel disposable tip adapters include a convenient tip ejector. Also for use with standard volumetric pipettes. The entire unit is autoclaveable and disassembles easily for cleaning.

### Ordering Information for Aspiration Accessories

Description	Model	Image
Handheld pipettor with 1 channel stainless steel 40 mm aspiration adapter and Pasteur pipette adapter	1475K-10	A
Adapter, stainless steel tip, 40mm	1475K-01	B
8-channel adapter, stainless steel	1475K-02	C
1-channel adapter for disposable tips, w/o ejector	1475K-03	D
Rubber adapter for Pasteur pipettes	1475K-04	E
8-channel adapter for disposable tips, with ejector	1475K-05	F
Adapter, stainless steel tip, 150mm	1475K-06	H
4-channel adapter, stainless steel tips, 40mm	1475K-07	I
Adapter, stainless steel tip, 280mm	1475K-08	J
1-channel adapter for disposable tips, with injector	1475K-09	K
Spare receiver kit-Includes: 6 ft tubing, 1.2L autoclaveable jar w/ lid and two hydrophobic filters	1475K-20	L
Replacement hydrophobic filters (10)	1475K-21	M
Momentary on/off foot switch w/ IEC connections, 90-230V, 50/60Hz	1430C	N
Momentary on/off foot switch 115V/60Hz	1430B	N

## ECONOMICAL SOURCE OF AIR FOR AERATION

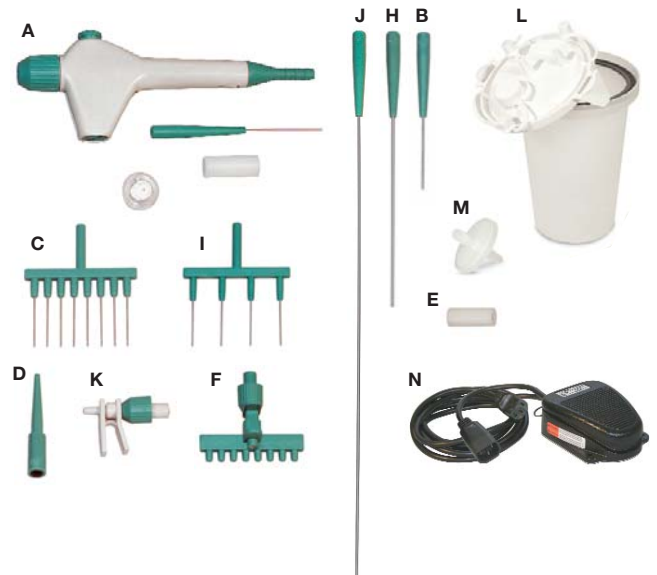


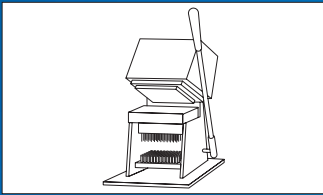
2430

- Rugged and durable for continuous operation
- Portable, quiet
- Low power consumption
- Economically priced

**MODEL 2430 CONTINUOUS DUTY AERATION PUMP** is effective for aeration of growing cell cultures. The pump's linear drive mechanism is very quiet and consumes little power. It delivers a steady, reliable flow of room air day and night for aerating growing cultures. Available models range from 1.2 to 3.6 CFM (34 to 102 L/min).

For Specifications & Ordering Information, See p. 32





# Applied Vacuum Technology for Laboratory Automation

## HIGH FLOW FOR ASPIRATING 96 OR 256 WELL SYSTEMS



2567B-70

- Effective for use in automated systems
- Oil-free for low maintenance
- In-line hydrophobic filter protects the pump
- Compact, lightweight, portable

### STANDARD DUTY DRY PISTON PUMP FOR AUTOMATED

**SYSTEMS** is effective *for aspiration of aqueous or buffer<sup>1</sup> samples.*

Designed for high throughput automated systems, Model 2567B-70 provides 100 L/min flow at 60 Hz (83 L/min at 50 Hz). This flow will provide aspiration power for 96 and 256 well systems.

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. Pumps are complete with vacuum adjustment, dial vacuum gauge, and hydrophobic inlet filter.

For Specifications  
See p. 24  
Order below

**Note:**

1. Not recommended for aspirating acidic, basic, or organic vapors or gases.

### Ordering Information

Description	Cat. No.
Standard duty vacuum pump w/filter, 115V, 60Hz, 1 Ph w/N. American plug.	2567B-70
Standard duty vacuum pump w/filter, 220V, 50Hz, 1 Ph w/Cont. European plug.	2567C-70

## HIGH FLOW FOR ASPIRATING HARSH CHEMICALS



2047

- Effective for use in automated systems
- PTFE dry diaphragm pump for aspirating acidic, basic, or organic liquids
- Compact, lightweight, portable

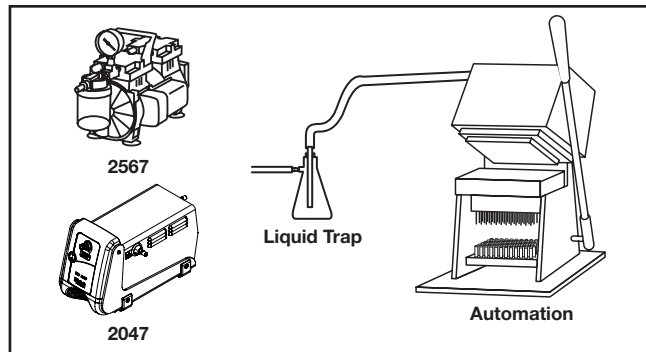
### DRYFAST PTFE DRY DIAPHRAGM PUMP FOR AUTOMATED

**ASPIRATION SYSTEMS** is effective for *aspirating liquids that are*

*strongly acidic, basic or organic.* Designed for high throughput

automated systems, Model 2047 provides 70 L/min flow at 60 Hz (58 L/min at 50 Hz). This flow will provide *aspiration power* for 96 and 256 well systems. 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.

For Specifications &  
Ordering Information,  
See p. 22

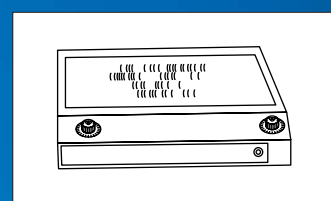


### Application Note on Aspiration

The most common reason for vacuum pump failure is ingestion of liquid into the pump mechanism. Dry vacuum pumps are designed for pumping gases and vapors. Liquids ingested into the pump mechanism will either cause the valves to fail on Standard Duty Pumps or the diaphragm to rupture on Chemical Duty Pumps. Automation waste reservoirs should be sized at a minimum of 2X the daily collected volume. Welch recommends a liquid trap installation between the pump and aspiration system. At the end of each day, the automation reservoir and liquid trap need to be emptied.



# Applied Vacuum Technology for Gel Dryer & Concentrator



## NO HASSLE GEL DRYING

## ONE PUMP FOR CONCENTRATOR AND GEL DRYER



1426



2025

- Fast results with crack-free gels
- No dry ice, no trap cleaning
- Drain condensate after 10-15 runs

- Saves valuable lab space
- Fast, high quality results
- Reliable PTFE dry pump

### THE REVOLUTIONARY GELMASTER™ GEL DRYER VACUUM SYSTEM

dries Acrylamide DNA or protein gels as **fast as a high vacuum oil sealed pump** with dry ice trap. However, it needs **no dry ice** and it eliminates cold trap cleaning. GELMASTER's unique design uses a **patented room temperature vapor trap** with a built-in dry vacuum pump. Condensate is collected in liquid form so there is no messy ice buildup and the **tenth drying run is as fast as the first**. When the collector reaches capacity, simply drain the contents and begin again. Does not require external cold trap.

### THE MODEL 2025 SELF-CLEANING DRY VACUUM SYSTEM™

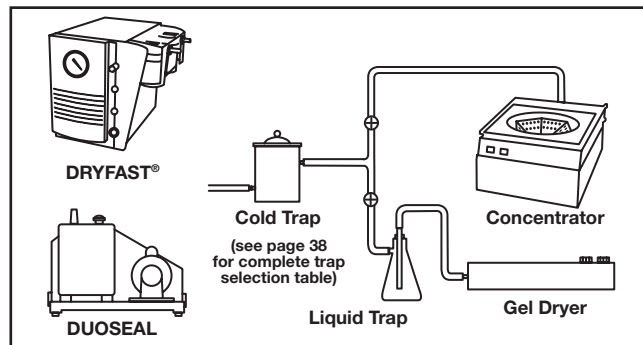
with 35 L/min (29 L/min at 50 Hz) of pumping capacity is **effective for either a concentrator or gel dryer**. Crowded laboratories find it convenient to use one vacuum pump for both devices. Simply assemble a basic manifold with tubing and two in-line valves. When the concentrator is in use, close the valve to the gel dryer, and vice versa. An in-line dry ice trap is recommended for this configuration.

GELMASTER comes complete and ready to use with 5 ft (1.5m) of 3/8 in (10mm) ID PVC vacuum tubing, in-line stopcock, hose clamps, detachable line cord, and one liter of trapping fluid. An annual flushing of the collector with 8995C-70 Flushing Fluid is recommended for optimum performance.

For Specifications & Ordering Information, See p. 23

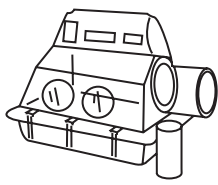
### Ordering Information

Description	Cat. No.
115V, 60Hz, 1 Ph w/N. American plug. Dmns: 14.25" L x 15.5" W x 14" H (36.2 x 39.4 x 35.6 cm). Weight: 33.5 lbs (15.2 kg)	142601
Same as 142601 w/220V, 50 Hz with Continental Europe (Schuko) plug.	142602
Same as 142601 w/230V, 60 Hz with North American plug.	142603
Same as 142601 w/100V, 50/60 Hz with US 115V plug (Japan)	142604
Same as 142601 w/220V, 50 Hz with UK plug.	142606
Trapping fluid, 1 Liter	8995C
Flushing fluid, 1 Gal (3.78 L)	8995C-70



### Works with all Gel Dryers Including:

Cat. No. (115V/60Hz)	Bio-rad	Hoefer	FisherBiotech	Labconco
142601 or 202501	583	SE 1200,GD 2000	FB-GD-45-10	4330100, 4330150



# Applied Vacuum Technology for Glove Box

## OIL-FREE EVACUATION OF GLOVE BOX AND TRANSFER STATION



2581

- 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<sup>3</sup> (0.84 m<sup>3</sup>). The pump is complete with vacuum adjustment, vacuum gauge to monitor vacuum level, and muffler. See application note below regarding glove box vacuum limitations.

For Specifications & Ordering Information, See p. 24

## HIGH VACUUM FOR STAINLESS STEEL/GLASS GLOVE BOXES



1402

- High vacuum to 0.0001 Torr
- High flow
- Very rugged and reliable

**DuoSeal® VACUUM PUMPS** are *effective for stainless steel and glass glove boxes* with high vacuum requirements. The deep vacuum model 1402 vacuum pump provides high flow vacuum for the regeneration cycle of your glove box. The rugged DuoSeal pump effectively manages the contaminants that are evolved during regeneration. This makes for a very reliable vacuum system for your critical glove box applications. NOTE: Optional exhaust filter catalog number 1417A is recommended for glove box applications to control exhaust oil mist (see page 37).

For Specifications & Ordering Information, See p. 30

### Application Note on Glove Boxes

Glove boxes are commonly used for transferring air sensitive compounds, containment of hazardous materials, and performing experiments under controlled conditions. Standard glove boxes and transfer chambers aren't 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 & heavy glass plates. These glove boxes include continuous gas purification of the main glove box chamber using a circulating fan or pump. After about 6 months, the purifier canister is regenerated by passing inert gas over the unit while it is heated followed by a few hours of full vacuum. Glove box manufacturers vary in their recommendation of the depth of vacuum needed in this final step to regenerate their purification canister.

# Applied Vacuum Technology for Vacuum Chamber



## OIL-FREE ROUGHING PUMP



2581

- Dry pump eliminates oil contamination
- 100 L/min flow with < 5 Torr vacuum
- Low maintenance
- Compact, lightweight, portable

**STANDARD DUTY DRY PISTON VACUUM PUMP** is effective for *roughing vacuum chambers, annular spaces* in dewars, etc. and *transfer lines*. The oil-free pump eliminates oil contamination from backstreaming and leakage for critical vacuum chamber applications. Standard duty dry piston pump is *economical to purchase and operate*. Very *rugged and reliable* pump can perform up to 20,000 roughing cycles of atm. to 5 Torr (6.7 mbar) before requiring piston seal replacement. The *portable* pump weighs only 24 lbs (10.9 kg). Model 2581 is equipped with handle, gauge, vacuum regulator, and inlet trap.

For Specifications &  
Ordering Information,  
See p. 24

## PORTABLE HIGH VACUUM ROUGHING PUMP



8912

- High vacuum to < 0.003 Torr
- Isolation device protects samples & system
- Portable, compact pump

**DIRECT DRIVE HIGH VACUUM PUMP** is *effective for roughing vacuum chambers to < 0.003 Torr*. The pump is also effective for *roughing annular spaces and transfer lines* to deep vacuum. Various models have flow from 73 to 320 L/min. Pumps are compact and transportable. The optional exhaust filter is recommended for elimination of oil mist during high vacuum roughing applications. See page 37 for the correct exhaust filter for your model.

For Specifications &  
Ordering Information,  
See p. 26

### Application Note for Roughing Vacuum Chambers

Evacuation of chambers, annular spaces and transfer lines is common in material science, physics and physical chemistry labs. These vacuum tight spaces are evacuated to provide insulation, roughing out the volume prior to using a turbomolecular pump, cryopump regeneration, etc. The depth of vacuum and size of the space determines what type and size of pump is needed.

A dry pump with a pumping capacity of 100 L/min can be used to evacuate 840 L volume (0.84 cubic meters) in a reasonable time. High vacuum pumps based on oil sealed rotary vane technology use the rule of thumb of 1 to 1.5 times the volume of space to determine pumping capacity (300 L volume needs a 300 to 350 L/min pump). The reason for the differing rule on oil sealed pumps is that the evacuation needs to be below 10 Torr in less than 30 minutes to avoid overheating the mechanism. Oil-free piston pumps don't overheat while evacuating larger chambers, however the time to maximum vacuum takes longer the smaller the pumping capacity.

## Dry Diaphragm PTFE Vacuum Pumps

### Chemical-Resistant, Oil-Free Pumps

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• Gel Dryer	19
• Distillation	
• Degassing	



2012



2034, 2044, 2037, 2047  
DRYFAST®



2032, 2042  
DRYFAST ULTRA®

### Specifications

Specifications	General Purpose Pumps		DRYFAST Pumps				DRYFAST ULTRA Pumps	
	2010	2012	2034	2044	2037	2047	2032	2042
Welch Model	2010	2012	2034	2044	2037	2047	2032	2042
Free Air Displacement								
CFM(L/min) @ 60Hz	0.45(12.7)	0.78(22)	0.9(25)	1.2(35)	1.8(50)	2.5(70)	0.9(25)	1.2(35)
m³/hr(L/min) @ 50Hz	0.63(10.6)	1.1(18)	1.25(21)	1.75(29)	2.5(42)	3.5(58)	1.25(21)	1.75(29)
Ultimate Pressure, Torr(mbar)	110(146)	100(133)	9(12)	9(12)	50(67)	35(47)	2(3)	2(3)
Maximum Vacuum, in. Hg	25.5	26	29.6	29.6	28.5	28.5	29.85	29.85
Motor Horsepower (watts)	1/12(62)	1/5(150)	1/5(150)	1/5(150)	1/5(150)	1/5(150)	1/5(150)	1/5(150)
Adjustable Vac./Gas Ballast	No	No	Yes	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)	1/4(7)	1/4(7)
Intake/Exhaust Thread NPT	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
Weight (lbs.)	5.25(2.4)	16.3(7.4)	21.25(9.6)	21.25(9.6)	21.25(9.6)	21.25(9.6)	21.25(9.6)	21.25(9.6)
Overall Dimensions								
L in. (cm)	6.3(16.0)	10(25.4)	13.8(35.2)	13.8(35.2)	13.8(35.2)	13.8(35.2)	13.8(35.2)	13.8(35.2)
W in. (cm)	5.5(14.0)	7(17.8)	6.8(17.2)	6.8(17.2)	6.8(17.2)	6.8(17.2)	6.8(17.2)	6.8(17.2)
H in. (cm)	7.5(19.0)	6.9(17.5)	8.8(22.3)	8.8(22.3)	8.8(22.3)	8.8(22.3)	8.8(22.3)	8.8(22.3)
Ship Weight, lbs (kg)	8(3.6)	20(9.1)	25(11.3)	25(11.3)	25(11.3)	25(11.3)	25(11.3)	25(11.3)
Shipping Carton Dimensions L x W x H in. (cm)	16x13x13 (41x32x33)	16x13x13 (41x32x33)	21x14x15 (52x35x37)	21x14x15 (52x35x37)	21x14x15 (52x35x37)	21x14x15 (52x35x37)	21x14x15 (52x35x37)	21x14x15 (52x35x37)

### Ordering Information

Wired for 115V, 60Hz, 1 Ph with N. Amer. 115V Plug	2010B-01	2012B-01	2034B-01	2044B-01	2037B-01	2047B-01	2032B-01	2042B-01
Wired for 230V, 50Hz, 1 Ph w/Cont. Euro. (Schuko) Plug	2010C-02	2012C-02	2034C-02	2044C-02	2037C-02	2047C-02	2032C-02	2042C-02
Wired for 100V 50/60Hz for Japan	—————	2012C-05	2034C-05	2044C-05	2037C-05	2047C-05	2032C-05	2042C-05

All Pumps are constructed with PTFE heads, perfluoroelastomer valves, and a PTFE coated, molded diaphragm. Includes intake / exhaust hose barbs. DRYFAST and DRYFAST ULTRA models include Advanced Vapor Management (AVM) for adjustable vacuum control. General Purpose pumps include exhaust silencer.



# Vacuum Pumps



2025

2027

2028

## For a Complete System

Component	Page
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### Self Cleaning Dry Vacuum Systems™

w/Dial Gauge	w/Dial Gauge	w/Digital Gauge	Programmable w/Digital Gauge
2025	2026	2027	2028
1.2(35)	1.2(35)	1.2(35)	1.2(35)
1.7(29)	1.7(29)	1.7(29)	1.7(29)
9(12)	2(2.7)	2(2.7)	2(2.7)
29.6	29.85	29.85	29.85
1/5(150)	1/5(150)	1/5(150)	1/5(150)
Yes	Yes	Yes	Yes
1/4(7)	1/4(7)	1/4(7)	1/4(7)
3/8	3/8	3/8	3/8
30(13.6)	30(13.6)	30(13.6)	30(13.6)
13.6(34.5)	13.6(34.5)	13.6(34.5)	13.6(34.5)
12(30.5)	12(30.5)	12(30.5)	12(30.5)
11.3(28.7)	11.3(28.7)	11.3(28.7)	11.3(28.7)
36(16.4)	36(16.4)	36(16.4)	36(16.4)
18x17x17 (46x42x43)	18x17x17 (46x42x43)	18x17x17 (46x42x43)	18x17x17 (46x42x43)

202501	202601	202701	202801
202503	—	202703	202803
202505	—	202705	202805

All Self Cleaning Dry Vacuum Systems are constructed with PTFE heads, perfluoroelastomer valves, and a PTFE coated, molded diaphragm. Advanced Vapor Management (AVM) for vacuum control, a vacuum readout, and instant-response bumping / foaming switching are standard on all models. Includes inlet / outlet separator traps and hose barb. Standard vacuum digital readout units: 115V: Torr; 230V: mBar; 100V: Pa.



### CAPTURE™ Harmful Vapors Prior to Intake

Protect your pump and lab atmosphere with an integrated CAPTURE recovery system. Connect this convenient condenser to your tap or chiller water to prevent pump fume ingestion and release into the environment.

### Ordering Information<sup>1</sup>

Description	Part No.
Complete condenser w/ flask/support/clamps	1420H-18
Condenser w/fittings	1420H-19
Support/clamp kit	1420H-17
Condenser fittings - tips (5), o-rings (5), caps (5)	1420H-20

Note:

1. Not available for models 2010 and 2012.



1420H-18

## Dry WOB-L® Piston Vacuum Pumps<sup>1</sup>

### Compact, Economical Oil-Free Pumps

#### Suited For:

- Vacuum Drying
- Desiccating
- Aspiration
- Degassing
- Chamber Roughing
- Filtration



2511



2522/2534



2546



2567/2561

### Specifications

	Vacuum/Pressure Pumps				Standard Duty Vacuum Pumps		
	2511	2522	2534	2546	2561	2567	2581
Welch Model	2511	2522	2534	2546	2561	2567	2581
Free Air Displacement							
CFM (L/min) @ 60Hz	0.39(11)	0.76(22)	1.2(34)	1.6(45)	2.1(60)	3.5(100)	3.5(100)
m <sup>3</sup> /hr (L/min) @ 50Hz	0.55(9.2)	1.1(18)	1.7(28)	2.3(38)	3.0(50)	4.9(83)	4.9(83)
Ultimate Pressure, Torr (mbar)	219(292)	100(133)	70(93)	60(80)	5(6.7)	60(80)	5(6.7)
Max Pressure PSIG (pascal)	33(3.3 x 10 <sup>5</sup> )	100(10 <sup>6</sup> )	50(5 x 10 <sup>5</sup> )	100(10 <sup>6</sup> )	—————	—————	—————
Maximum Vacuum, in. Hg	21.3	26	27.2	27.6	29.8	27.6	29.8
Motor Horsepower (watts)	1/30(25)	1/8(93)	1/8(93)	1/4(190)	1/3(250)	1/3(250)	1/3(250)
Tubing Needed, I.D. in. (mm)	3/16(5)	1/4(7)	1/4(7)	1/4(7)	3/8(10)	3/8(10)	3/8(10)
Intake/Exhaust Thread NPT	3/16 in. Hose	1/4	1/4	1/4	1/4	1/4	1/4
Weight (lbs.)	5	11.7	11.7	13.8	16.5	16.5	24.5
Overall Dimensions							
L in. (cm)	7.6(19.4)	8.1(20.6)	8.1(20.6)	10(25.4)	17.3(43.9)	15.0(38.1)	17(43.2)
W in. (cm)	4.5(11.4)	8.8(22.4)	8.8(22.4)	7.5(19.1)	6.5(16.5)	10(25.4)	7.5(19.1)
H in. (cm)	7.5(19.1)	10(25.4)	10(25.4)	9(22.9)	10.5(26.7)	10(25.4)	12(30.5)
Ship Weight, lbs (kg)	6(2.7)	17(7.7)	17(7.7)	17(7.7)	24(10.9)	24(10.9)	32(14.5)
Shipping Carton Dimensions	13 x 9 x 9.5	15 x 10.5 x 12	15 x 10.5 x 12	15 x 10.5 x 12	21.5 x 12.5 x 16	21.5 x 12.5 x 16	21.5 x 12.5 x 16
L x W x H in. (cm)	(33 x 23 x 24)	(38 x 27 x 31)	(38 x 27 x 31)	(38 x 27 x 31)	(55 x 32 x 41)	(55 x 32 x 41)	(55 x 32 x 41)

### Ordering Information<sup>1,2</sup>

Wired for 115V, 60Hz, 1 Ph with N. American 115V Plug	2511B-01 <sup>3</sup>	2522B-01 <sup>4</sup>	2534B-01 <sup>4</sup>	2546B-01 <sup>4</sup>	2561B-50	2567B-50	2581B-50
Wired for 230V, 60Hz, 1 Ph with N. American 230V Plug	—————	2522C-01 <sup>4</sup>	2534C-01 <sup>4</sup>	2546C-01 <sup>4</sup>	—————	—————	—————
Wired for 230V, 50Hz, 1 Ph <sup>2</sup> with Cont. Euro.(Schuko) Plug	2511C-02 <sup>3</sup>	2522C-02 <sup>4</sup>	2534C-02 <sup>4</sup>	2546C-02 <sup>4</sup>	2561C-50	2567C-50	2581C-50
Wired for 100V, 50/60Hz, 1 Ph with a plug	2511C-05 <sup>3,5</sup>	2522C-05 <sup>4,5</sup>	—————	—————	2561C-56	—————	2581C-56

#### 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. 50Hz units supplied with CE marking.



2585/2581



2511B-75



2515B-75

Aspiration/Filtration Systems include 6 Ft. of tubing and two hydrophobic filters

Aspiration/Filtration Systems		
2585	2511	2515
7.1(201)	0.39(11)	1.2(34)
10(168)	0.55(9.2)	1.7(28)
60(80)	219(292)	70(93)
—	33(3.3 x 10 <sup>5</sup> )	—
27.6	21.3	27.2
1/3(250)	1/30(25)	1/8(93)
3/8(10)	3/16(5)	1/4(7)
1/4	3/16 in. Hose	1/4
24.5	5.7	13.2
17(43.2)	11.0(28)	14.8(37.5)
7.5(19.1)	8.3(21)	8.3(21)
12(30.5)	10.0(25.5)	10.0(25.5)
32(14.5)	11.0(5)	14.8(6.7)
21.5 x 12.5 x 16 (55 x 32 x 41)	21.5 x 12.5 x 16 (55 x 32 x 41)	21.5 x 12.5 x 16 (55 x 32 x 41)

2585B-50	2511B-75	2515B-75
—	—	—
2585C-50	2511C-75	2515C-75
—	2511C-76°	2515C-76

- Model 2511 can deliver 33 PSIG (3.3 x 10<sup>5</sup> pascal).
- 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<sup>6</sup> pascal). Model 2534 can deliver 50 PSIG (5 x 10<sup>5</sup> pascal).
- Comes with PSE mark.

## Accessories

### Vacuum Hose

Thick walled hose for vacuum or pressure applications. Hose clamp information available on page 35.

Pump Model	Cat. No.
2522, 2534, 2545, 2561, 2565, 2581, 2585	331030-5
2511	331020-5



### Exhaust Silencer

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

Pump Model	Cat. No.
2565, 2585	1412C
2561	1412D
2581	1412E
2012, 2022, 2030, 2015, 2017	1412B



### Inlet/Exhaust Separator/Jars

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

Pump Model	Cat. No.
2010, 2012, all models of DryFAST	1423B
Replacement Jars Glass, for pumps w/1423B assembly, models 2561, 2565, 2581, 2585 and Self Cleaning dry pumps	1415B
Plastic, for pumps 2522, 2546, 2534	1415C



### Replacement Jars for Aspiration Stations

Spare receiver kit (1475K-20) includes a 1.2 L autoclaveable jar, 6Ft. of tubing and two hydrophobic filters.

Pump Model	Cat. No.
2511B-75, 2511C-75 2515B-75, 2515C-75	1475K-20



### Particulate, Hydrophobic In-line Filters

The filters are an economical solution to protect your piston vacuum pump from fine particulates and aerosols to 0.2 microns in diameter.

Made of Polypropylene housing, cat. no. 1475K-21 fits 1/4" to 3/8" and cat. no. 1475K-23 fits 1/4" I.D. hose.

Made of SBS resin housing, model 1475K-22 fits 3/8" to 7/16" I.D. hose.

Pump Model	Cat. No.	Pore Size
2511, 2515, 2522, 2534, 2546	1475K-21	0.8 micron
2561, 2581, 2562, 2567	1475K-22	0.8 micron
2562, 2567	1475K-23	0.2 micron



## Welch® Vacuum Pumps

Lightweight, Compact, High Performance Pumps

Suited For:

- General Vacuum Work
- Laboratory Applications
- OEM Instrumentation
- Replacement Pumps for Instruments and Equipment



8890<sup>3</sup>



8905



8907/8912/8917

### Specifications

	Two Stage Pumps					
Welch Model	8890	8905	8907	8912	8917	8920
Free Air Displacement						
CFM (L/min) @ 60Hz	1.1(31)	1.8(51)	2.6(73)	3.8(108)	6.1(173)	7.7(218)
m <sup>3</sup> /hr (L/min) @ 50Hz	1.6(26)	2.6(43)	3.7(61)	5.4(90)	8.6(144)	10.9(182)
Ultimate Pressure, Torr (mbar) <sup>1</sup>	1 x 10 <sup>-1</sup> (0.133)	2 x 10 <sup>-3</sup> (0.0027)	1x10 <sup>-4</sup> (0.00013)	1x10 <sup>-4</sup> (0.00013)	1x10 <sup>-4</sup> (0.00013)	3 x 10 <sup>-4</sup> (0.0004)
Sound Level, dBA	58	52	50	50	50	54
Motor/Pump Speed (60Hz)	3450	3450	1725	1725	1725	1725
Motor Horsepower (watts)	1/4(190)	1/4(190)	1/2(370)	1/2(370)	1/2(370)	1/2(370)
Oil Capacity, qt. (liters)	0.48(0.45)	0.42(0.4)	1.0(0.95)	0.9(0.86)	0.9(0.86)	1.3(1.2)
Tubing Needed, I.D. in. (mm)	3/8 (10)	3/16, 7/16 (5, 11)	7/16, 13/16 (11, 20)	7/16, 13/16 (11, 20)	7/16, 13/16 (11, 20)	9/16, 13/16 (14, 20)
Intake Connection <sup>2</sup> (thread)	Barb (1/4 in NPT)	UNIBARB (3/4-20)	UNIBARB (1 1/8-20)	UNIBARB (1 1/8-20)	UNIBARB (1 1/8-20)	UNIBARB (1 1/8-20)
Exhaust Connection <sup>3</sup>	3/4-20	3/4-20	1-20	1-20	1-20	1-20
Weight, lbs (kg)	24.5(11.1)	24.5(11.1)	40(18)	41(18)	43(19.5)	58.5(26.6)
Overall Dimensions						
L in. (cm)	14.5(36.8)	14.1(35.9)	18.5(47.1)	18.5(47.1)	18.5(47.1)	20.5(52.1)
W in. (cm)	5.1(13)	5.1(13)	6.5(16.5)	6.5(16.5)	6.5(16.5)	7.1(17.9)
H in. (cm)	8.4(21.3)	8.4(21.3)	9.6(24.3)	9.6(24.3)	9.6(24.3)	10.7(27.2)
Ship Weight, lbs (kg)	33(15)	33(15)	55(25)	55(25)	60(27.3)	71(32.3)
Shipping Carton Dimensions L x W x H in. (cm)	21.5 x 12.5 x 16 (54.6 x 31.8 x 40.6)	21.5 x 12.5 x 16 (54.6 x 31.8 x 40.6)	24 x 15.8 x 14 (61 x 40.1 x 35.6)	24 x 15.8 x 14 (61 x 40.1 x 35.6)	24 x 15.8 x 14 (61 x 40.1 x 35.6)	24 x 15.8 x 14 (61 x 40.1 x 35.6)

### Ordering Information<sup>4, 5, 6.</sup>

Wired for 115V, 60Hz, 1 Ph with N. American 115V Plug	8890A <sup>7,8.</sup>	8905A	8907A	8912A	8917A	8920A
Wired for 230V, 50Hz, 1 Ph with Cont. Euro. (Schuko) Plug	8890C-02 <sup>7,8.</sup>	8905C-02	8907C-02	8912C-02	8917C-02	8920C-02
Wired for 230V, 60Hz <sup>5</sup> with N. American 230V Plug	—————	—————	—————	8912C-01	8917C-01	8920C-01
Expl. Proof Motor 115V, 60Hz	—————	—————	—————	—————	8917W	—————

**Notes:**

1. Models 8905, 8907, 8912, 8917, 8920, and 8925 should not be operated continuously at pressures above 10 Torr. Ultimate pressure measured with a trapped McCleod gauge.
2. UNIBARB™: Convenient inlet barb connection accepts two sets of tubing ID (see page 34).
3. Model 8890 includes 1417 filter, it is not included with any other model.
4. All single phase motors have overload protection
5. 115V, 60Hz models are CSA approved.





8920



8925

Special Application Systems		
8925	Rotovap Pump <sup>6</sup>	Freeze Dryer Pump <sup>9</sup>
11.3(320)	1.1(31)	6.1(173)
16(267)	1.6(26)	8.6(144)
4 x 10 <sup>-4</sup> (0.00053)	1x10 <sup>-3</sup> (0.133)	1x10 <sup>-4</sup> (0.00013)
55	58	50
1725	3450	1725
3/4(560)	1/4(190)	1/2(370)
1.2(1.1)	0.48(0.45)	1.4(1.3)
9/16, 13/16 (14, 20)	3/8 (10)	7/16, 13/16 (11, 20)
UNIBARB (1 1/8-20)	Barb (1/4 in NPT)	UNIBARB (1 1/8-20)
1-20	3/4-20	1-20
69(31.3)	27.5(12.5)	55(25)
21.2(53.8)	14.5(36.8)	18.6(47.2)
7.1(17.9)	5.1(13)	11.5(29.2)
10.7(27.2)	14.3(36.3)	9.6(24.4)
74(33.6)	37(16.8)	70(31.8)
24 x 15.8 x 14 (61 x 40.1 x 35.6)	21.5 x 12.5 x 16 (54.6 x 31.8 x 40.6)	25 x 18.5 x 14 (63.5 x 47 x 35.6)

8925A	8890A-70	8917A-80 <sup>10</sup>
8925C-02	8890C-72	8917C-80
8925C-01	_____	_____
8925W	_____	_____

- 230V, 50 Hz models which are provided with CE mark.
- Cat No. 1416B Exhaust Oil Recycler is recommended when operating the GEM at pressures of 1 Torr or higher.
- Rotovap/Vacuum manifold pump – see page 8, 12.
- Freeze Dryer Pump – see page 15.
- Order 8917C-80 and cord set 8906M for 230V, 60Hz, 1 Ph.

## Accessories and Oil

### Exhaust Filter

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

Pump Model	Cat. No.
8890, 8905	1417
8907	1417P-7
8920, 8925, 8912, 8917	1417P-10

(See page 37 for a complete list of filters)



### Exhaust Oil Recycler

Use when pumping continuously above 1 Torr. Captures oil mist from the pump, and returns collected oil to the pump via a gas ballast connection.

Pump Model	Cat. No.	CFM
8890 (GEM)	1416B	3
8905	1416H	3
8907, 8912, 8917, 8920, 8925	1416C	9

(See page 37 for a complete list of filters)



### Dry Ice/Liquid Nitrogen Trap

Recommended to protect pump from condensable vapors. Use either dry ice slurry or LN2 in the 3 quart center well. See pgs. 38 & 39.

Pump Model	Cat. No.
8890, 8905, 8907, 8912, 8917, 8920, 8920	1420H-14

(See page 38 for Trap Selection Table)



### Premium Vacuum Pump Oil

Higher viscosity formula that resists breakdown at higher RPM and temperatures of direct drive vacuum pumps.

Size	Cat. No.
Liter	8995P-11
Gallon	8995P-15
5 Gallon	8995P-20



### Gold Vacuum Pump Oil

Specially formulated oil for challenging applications. This highly saturated synthetic oil is resistant to breakdown at higher temperature and is highly stable in chemical environments.

Size	Cat. No.
Liter	8995G-11
Gallon	8995G-15
5 Gallon	8995G-20



# CHEMSTAR® Pumps For Corrosive Gases

## CHEMSTAR Vacuum Pumps

### For Pumping Corrosive Gases

- HCl      • O<sub>3</sub>              • H<sub>2</sub>SO<sub>4</sub>
- HBr     • HOAc             • SO<sub>x</sub>
- Br<sub>2</sub>    • F<sub>3</sub>CCO<sub>2</sub>H      • H<sub>2</sub>S
- Cl<sub>2</sub>    • CH<sub>2</sub>O            • HNO<sub>3</sub>
- SF<sub>6</sub>, CF<sub>4</sub> Fragments and other gases



1402N

### 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
  - Metal vanes
  - Stainless steel valves, etc.
  - Teflon® coated oil case
3. Reduced Frictional Wear
  - Less than 580 RPM vs. typical 1750 RPM direct drive
4. Nitrogen Purge Standard
  - Degases and cools oil
5. Easy Attachment of Accessories
  - Complete accessory package for corrosive gases

### Specifications<sup>1</sup>

	CHEMSTAR Vacuum Pumps		
	1400N	1402N	1376N
Free Air Displacement			
CFM	0.9	5.6	10.6
L/min	25	160	300
Ultimate Pressure, Torr(mbar) <sup>1</sup>	1 x 10 <sup>-4</sup> (0.00013)	1 x 10 <sup>-4</sup> (0.00013)	1 x 10 <sup>-4</sup> (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	NW 16	NW 25	NW 25
Dimensions L x W x H in. (cm)	17.8 x 9 x 12.6 (45.2 x 22.9 x 32)	19.3 x 14.1 x 15.4 (49 x 35.3 x 39.1)	19.3 x 12.3 x 15.6 (49 x 31.2 x 39.6)
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 L x W x H in. (cm)	20.5 x 13.8 x 14.5 (52.1 x 35.1 x 36.8)	22.5 x 15.5 x 19.5 (57.2 x 39.4 x 49.5)	22 x 18 x 19 (59.5 x 45 x 48)

### Ordering Information<sup>2,4,5</sup>

Wired for 115V, 60Hz, 1 Ph with N. American 115V Plug	1400N-01	1402N-01	1376N-01
Explosion Proof Motor 115V, 60Hz, 1 Ph	1400N-90 <sup>3</sup>	1402N-90 <sup>3</sup>	—————
Wired for 230V, 60Hz, 1 Ph with N. American Plug	—————	1402N-60	1376N-60
Wired for 220V, 50Hz, 1 Ph with Cont. Euro. (Schuko) Plug	1400N-50 <sup>6</sup>	1402N-50 <sup>6</sup>	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.

# Protective Accessories For Corrosive Gases

## Protective Accessories For CHEMSTAR® Pumps

- Heavy Corrosive Gas Loads
- Contaminated Exhaust Oil Mist
- Particulates In Gas Streams



- 1 Acid Neutralization Trap
- 2 Hermetically Sealed Oil Mist Eliminator
- 3 Make The Clear Choice



3

## Acid Neutralization Traps



The Acid Neutralization Trap contains a large alkaline 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. Dimensions: 1420H-21, 8" W x 9" H; 1420H-20, 8" W x 13" H. (See CHEMSTAR application booklet for specific recommendations for use.)

ISO SIZE	CAPACITY	CATALOG NUMBER		
		TRAP	PUMP CONNECTOR KIT FOR TRAP <sup>1</sup>	REPLACEMENT ELEMENT
NW 16	To 2 CFM	1420H-21	1420K-16	1420E-02
NW 25	To 12 CFM	1420H-20	1420K-25	1420E-01

1. Includes hinge clamp, centering ring and elbow. Use with CHEMSTAR vacuum pumps.

## Hermetically Sealed Oil Mist Eliminators



When attached to an effective exhaust line, the hermetically sealed oil mist eliminator prevents corrosive vacuum pump exhaust gases from escaping into the room. It also 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. Dimensions of cat no. 1416D: 5" W x 7-3/4" H; 1416F, 5" W x 13-3/8" H. 1416D exhaust port accepts 13/16" I.D. hose.

USE WITH PUMP MODEL	CATALOG NUMBER		
	MIST ELIMINATOR	PUMP ADAPTER KIT	REPLACEMENT ELEMENT
1400N	1416D	1416E-01	1417Y-05
1402N, 1376N	1416D	1416E-02	1417Y-05

## Make The Clear Choice



8995G-11

Pump oil Condition Color



**Good**



**Bad(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.**

For Vacuum Pump Oils  
See p. 43

## DUOSEAL® Vacuum Pumps

Long Service Life Due  
To Low Pump RPM

In Demanding Applications Such As:

- Freeze Drying
- Concentrating
- Vacuum Manifold/Schlenk Line
- Degassing
- Vacuum Distillations
- Vacuum Drying



1399N



1400



1405/1402

### Specifications

#### Two-Stage Vacuum Pumps<sup>1</sup>

	1400	1405	1402	1376	1397
Welch Model	1400	1405	1402	1376	1397
Free Air Displacement					
CFM	0.9	3.2	5.6	10.6	17.7
L/min	25	90	160	300	500
Ult. Pressure, Torr(mbar) <sup>1</sup> :	1 x 10 <sup>-4</sup> (0.00013)	1 x 10 <sup>-4</sup> (0.00013)	1 x 10 <sup>-4</sup> (0.00013)	1 x 10 <sup>-4</sup> (0.00013)	1 x 10 <sup>-4</sup> (0.00013)
Gas Ballast	Yes	Yes	Yes	Yes	Yes
Pump RPM	580	525	525	525	400
Motor Horsepower (watts)	1/3(250)	1/2(370)	1/2(370)	1(750)	1(750)
Oil Capacity, qt. (liters)	0.62(0.59)	2.25(2.1)	2.25(2.1)	2.5(2.4)	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)
Intake, Nipple Thread	3/4-20	1-20	1-20	1-20	1.75-20
Exhaust, Thread Type	3/4-20	1-20	1-20	1-20	1.75-20
Weight, lbs (kg)	58(26)	112(51)	112(51)	156(71)	205(93)
Overall Dimensions					
L in. (cm)	17.8(45.1)	20(51)	20(51)	20(51)	26(66)
W in. (cm)	9(22.9)	12(30.5)	12(30.5)	14.1(35.9)	13.7(34.8)
H in. (cm)	12.6(32.1)	15(38.1)	15(38.1)	15.4(39)	18.8(47.6)
Ship Weight, lbs (kg)	70(31.8)	132(60)	132(60)	180(81.8)	213(96.8)
Shipping Carton Dimensions L x W x H in. (cm)	20.5 x 13.8 x 14.5 (52.1 x 35.1 x 36.8)	22.5 x 15.5 x 19.5 (57.2 x 39.4 x 49.5)	22.5 x 15.5 x 19.5 (57.2 x 39.4 x 49.5)	22 x 18 x 19 (55.9 x 45.7 x 48.3)	27.3 x 18 x 22 (69.3 x 45.7 x 55.9)

### Ordering Information<sup>3,4</sup>

Wired for 115V, 60Hz, 1 Ph with N. American 115V Plug	1400B-01 <sup>6</sup>	1405B-01 <sup>6</sup>	1402B-01 <sup>6</sup>	1376B-01	1397B-01
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, 60Hz	1400W-01 <sup>5</sup>	1405W-01 <sup>5</sup>	1402W-01 <sup>5</sup>	_____	_____
3-Phase Motor 230V, 460V, 60Hz	_____	_____	1402M-01	1376M-01	1397M-01

**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.

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.



## Accessories and Oil



1376



1397/1374

	One-Stage Vacuum Pumps <sup>2</sup>	
	w/o plate	w/bell jar plate
1374	1399	1399N
23	1.2	1.2
650	35	35
$1 \times 10^{-4}$ (0.00013)	$1.5 \times 10^{-2}$ (0.019)	$1.5 \times 10^{-2}$ (0.019)
Yes	No	No
510	750	750
1-1/2(1120)	1/3(250)	1/3(250)
1.25(1.2)	0.5(0.47)	0.5(0.47)
1-5/8(41)	7/16(11)	7/16(11)
1.75-20	3/4-20	3/4-20
1.75-20	3/4-20	3/4-20
220(100)	51(23)	63(28.6)
26(66)	17(43.2)	17(43.2)
13.7(34.8)	9(22.9)	9(22.9)
18.8(47.6)	10(25.4)	10(25.4)
215(97.7)	62(28.2)	74(33.6)
27.3 x 18 x 22 (69.3 x 45.7 x 55.9)	20.5 x 13.8 x 14.5 (52.1 x 35.1 x 36.8)	20.5 x 13.8 x 14.5 (52.1 x 35.1 x 36.8)

1374B-01 <sup>5</sup>	1399B-01	1399N-01
_____	_____	_____
1374C-02 <sup>5</sup>	1399C-02	_____
_____	_____	_____
1374M-01	_____	_____

5. Conduit wiring installation required. No cord, plug or switch provided.  
6. CSA approved models are 1400B-80, 1405B-80 and 1402B-80.

### Exhaust Filter

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



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

(See page 37 for a complete list of filters)

### Exhaust Oil Recycler

Use when pumping continuously above 1 Torr. Captures oil mist from the pump and returns it to the pump via a gas ballast connection.



Pump Model	Cat. No.	CFM
1400	1416H-01	3
1376, 1402, 1405	1416C-01	8

(See page 37 for a complete list of filters)

### Dry Ice/Liquid Nitrogen Trap

Recommended to protect pump from condensable vapors. Use either dry ice slurry or LN2 in the 3 quart center well. Accepts 7/16" I.D. Hose.



Pump Model	Cat. No.
1400, 1405, 1402, 1376, 1399	1420H-14

(See page 38 for Trap Selection Table)

### 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
55 Gallon	1407K-25

### Gold Vacuum Pump Oil

Specially formulated oil for challenging applications. This highly saturated hydrocarbon oil is resistant to breakdown at higher temperature and is highly stable in chemical environments.



Size	Cat. No.
Liter	8995G-11
Gallon	8995G-15
5 Gallon	8995G-20
55 Gallon	8995G-25

# Water-Jet Aspirator & Linear Compressor



## ECONOMICAL WATER-JET ASPIRATOR

- Water saving alternative to water tap aspirators
- Two vacuum ports for multiple users
- Polypropylene reservoir resists corrosives

### WATER-JET ASPIRATOR PUMP FOR VACUUM FILTRATION

is **effective for vacuum filtration**. The circulating pump forces water over two separate venturi's, supporting **two vacuum ports**. The pump **saves water** compared to tap water aspirators. A built-in check valve protects the filtration system. The polypropylene 10 L reservoir **resists corrosive vapors**.

## Specifications

Welch Model  
Free Air Displacement  
CFM(L/min)  
Ultimate Pressure, Torr(mbar)  
Max Vacuum, in. Hg  
Tubing, I.D. in.(mm)  
Weight, pump only, lbs.(kg)  
Dimensions of pump only LxWxH, in.  
cm  
Shipping weight, pump only lbs.(kg)

Aspirator
4050
0.3(8.5)
178(237)
22.9
3/8(10)
5.3
5.83x5.04x4.38
14.81x12.80x11.13
7(3.2)

## Ordering Information

Welch Model  
  
Wired for 115V, 60Hz, 1 Ph  
with N. American 115V Plug  
  
Wired for 230V, 50Hz, 1 Ph  
with cont. Euro.(Schuko) Plug

Aspirator
4050
4050B-01
4050C-02



## ECONOMICAL PUMP FOR AERATION

- Quiet, linear diaphragm mechanism
- Continuous pressure to 4 PSI
- Oil-less

**LINEAR DIAPHRAGM COMPRESSORS** employ a linear/vibrating armature to move a diaphragm to generate compressed air for aeration in life science and environmental applications. The unit is low in vibration, generates little heat, low power consumption, and is low in noise. The mechanism is continuous duty.

## Specifications

Welch Model  
Free Air Displacement  
CFM(L/min) @ 60Hz  
m<sup>3</sup>/hr(L/min) @ 50Hz  
Max Pressure, PSIG (pascal)  
Inlet thread NPT  
Tubing, I.D. in.(mm)  
Weight, pump only, lbs.(kg)  
Dimensions of pump only LxWxH, in.  
cm  
Shipping weight, lbs.(kg)

Linear Compressors			
2420	2430	2460	2478
1.24(35)	2.0(56)	3.2(91)	3.6(102)
1.45(29)	2.4(47)	3.8(76)	4.4(85)
3(3x10 <sup>4</sup> )	3(3x10 <sup>4</sup> )	4(4x10 <sup>4</sup> )	3(3x10 <sup>4</sup> )
1/8	3/8	3/8	3/16
3/8(10)	3/8(10)	3/8(10)	3/8(10)
5.3	11	13.2	18.3
5.83x5.04x4.38	4.83x6.83x7.79	4.83x6.83x7.79	10.01x8.94x8.59
14.81x12.80x11.13	12.27x17.35x19.79	12.27x17.35x19.79	25.43x22.71x21.82
7(3.2)	13(5.9)	16(7.3)	21.3(9.5)

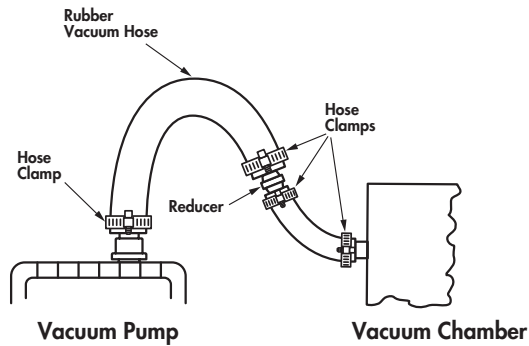
## Ordering Information

Wired for 115V, 60Hz, 1 Ph  
with N. American 115V Plug  
  
Wired for 230V, 50Hz, 1 Ph  
with cont. Euro.(Schuko) Plug

2420B-01	2430B-01	2460B-01	2478B-01
2420C-02	2430C-02	2460C-02	2478C-02

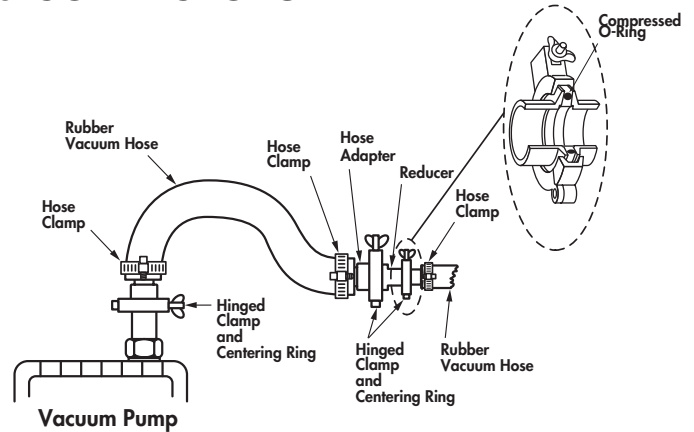
# Vacuum Systems Connectors & Accessories

## VACUUM HOSE & CONNECTORS



Hose Nipple Connections

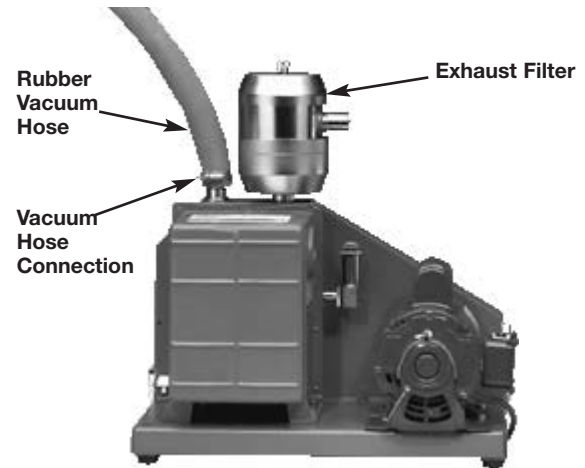
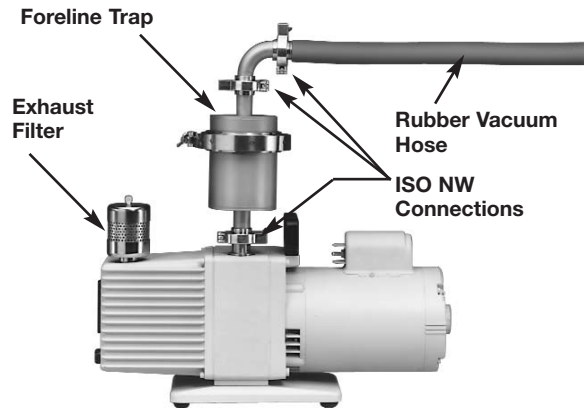
- Inexpensive
- Flexible
- For vacuum systems where the need for disassembly is infrequent
- Recommended for vacuum to  $10^{-3}$  Torr



Hose To ISO Connections

- Combines flexibility and frequent detachment ability
- Recommended for vacuum to  $10^{-3}$  Torr

## VACUUM ACCESSORIES



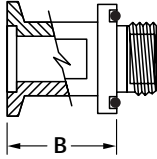
- **Exhaust Filter** - Connects to pump's outlet. Filters oil mist from the pump's exhaust to keep your working area clean and air quality healthful. A second option is an exhaust line to a vapor hood or other outside exhaust vent. This requires an adapter and air tight connections (see pages 27, 29, 31, 34-37).
- **Vacuum Oil** - Use of high quality vacuum oil is necessary for both vacuum performance and pump lifetime. With lesser quality oil the vacuum is degraded and pump lifetime is shortened. Welch offers three grades of vacuum oil designed especially for use in DuoSEAL and Direct-Drive vacuum pumps (see pages 27, 31, 43).
- **Foreline Trap** - Protects the vacuum pump from harmful substances present in the vacuum system and/or formed during the vacuum process. Can also block vacuum pump oil from backstreaming into the system and contaminating samples (see page 38 for Trap Selection chart). Failure to use a foreline trap, when recommended, can result in serious damage to the vacuum pump. Advice from Welch is available to help in selection of the proper trap.

See also Vacuum Gauges, page 42 and Vacuum Regulators, pages 40, 41.

# Vacuum System Connectors & Tubing

## ISO NW Inlet Connectors for High Vacuum Pumps

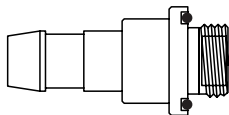
- Stainless steel with o-ring
- No sealant required for installation
- For pumps above listed serial number



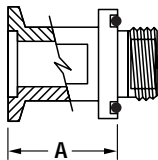
ISO	THREAD SIZE	PUMP MODEL	SERIAL NO.	B	CAT. NO.
NW 16	3/4-20	1399	>26461	1.12	1393F
NW 16	3/4-20	1400, 1400N	>18069	1.12	1393F
NW 25	1-20	1405	>77703	1.2	1393G
NW 25	1-20	1380	>2114	1.2	1393G
NW 25	1-20	1402, 1402N	>133218	1.2	1393G
NW 25	1-20	1376, 1376N	>14594	1.2	1393G
NW 40	1-20	1374	>73519	1.4	1393H
NW 40	1.75-20	1397	>51217	1.4	1393H
NW 16	3/4-20	8905	All	1.12	8905K-05
NW 25	1 1/8-20	8907, 8912, 8917, 8920, 8925	All	1.4	8907K-05

## Exhaust Connectors for High Vacuum Pumps

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



Hose Connector



ISO Connector

PUMP MODELS	HOSE CONNECTOR		ISO CONNECTOR			
	HOSE I.D.	CAT. NO.	THREAD SIZE	ISO NW	A	CAT. NO.
1399, 1400, 8905, 8890	7/16	1393J	3/4-20	NW 16	1.12	1393F
1402, 1380, 1376, 8920, 8925, 8907, 8912, 8917, 1405	13/16	1393K	1-20	NW 25	1.2	1393G
1374, 1397	1-5/8	1393L	1 3/4-20	NW 40	1.4	1393H
1405, 1402	7/16	1393M	1-20	NW 25	1.2	1393G

## UNIBARB™ Inlet Connectors For High Vacuum Pumps

- Accepts two sets of tubing ID
- Aluminum
- With inlet screen



THREAD SIZE	PUMP MODEL	Hose I.D.	CAT. NO.
3/4-20	1400, 1399, 8905	3/16" & 7/16"	8905K-06
1 1/8-20	8907, 8912, 8917	7/16" & 13/16"	8907K-06
1 1/8-20	8920, 8925, 8917	9/16" & 13/16"	8920K-06

## Brass Hose Barb

- Brass
- For use with ISO to female pipe adaptors



1393X

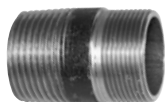
HOSE BARB	THREAD	HOSE I.D.	CAT. NO.
1/4	1/4 NPT	3/16 and 3/8	1393X

Dimensions are in inches



# Vacuum System Connectors & Tubing

## 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

## Red Vacuum Hose • Hose Clamps

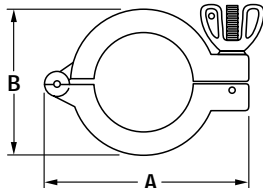


- Very thick walled hose for vacuum or pressure applications
- Quick-acting clamp tightened by a thumbscrew actuated worm screw
- Hose comes in 5 ft. lengths (1.5m)

SPECIFICATIONS			HOSE KIT CAT. NO.					CLAMPS CAT. NO.
I.D.	WALL THICKNESS	O.D.	5ft only	10ft only	15ft only	20ft only	25ft 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	-	-	331050-25	305350
13/16	3/8	1-9/16	331060-5	331060-10	331060-15	305360-20	-	305360
1 5/8	11/16	3	331080-5	331080-10	-	-	-	305380

\*Hose works with pumps that accept 3/8 in. I.D. hose.

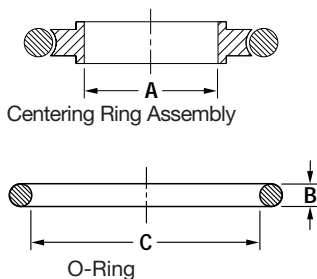
## Hinged Clamps



- 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

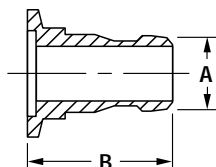
## Centering Assemblies • Replacement O-Rings



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

ISO	CENTERING RING ASSEMBLY		REPLACEMENT O-RING		
	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



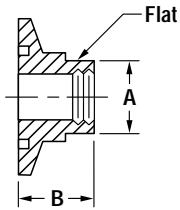
- ISO NW to rubber vacuum hose
- Aluminum

ISO	HOSE I.D.	A	B	CAT. NO.
NW 16	7/16	0.625	1.65	501241
NW 16	5/8	0.750	1.65	501251
NW 25	13/16	0.875	1.73	501262
NW 40	1-5/8	1.63	2.17	501283

Dimensions are in inches

# Vacuum System Connectors & Tubing

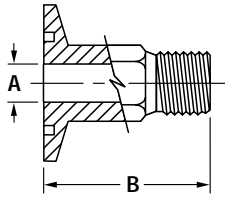
## Female Pipe Adapters



- Female stubs have 1/8 in. to 3/4 in. NPT
- Stainless steel
- Can be used with many gauge probes including Welch No. 1515A and 1600B-01 (see pages 41, 42)
- Can be used with brass hose barbs (see page 34)

ISO	NPT	A	B	CAT. NO.
NW 16	1/8	0.62	0.50	506111
NW 16	1/4	0.62	0.50	506121
NW 25	1/8	0.88	0.50	506112
NW 25	1/4	0.88	0.50	506122
NW 25	1/2	0.88	0.50	506142

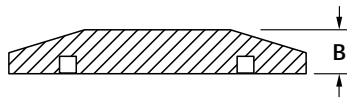
## Male Pipe Adapters



- Male stubs have 1/8 in. to 3/4 in. NPT
- Hex shank
- Stainless steel

ISO	NPT	A	B	CAT. NO.
NW 16	1/4	0.281	1.6	505121
NW 25	1/8	0.188	1.6	505112
NW 25	1/4	0.281	1.6	505122
NW 25	1/2	0.496	1.6	505142
NW 25	3/4			505162

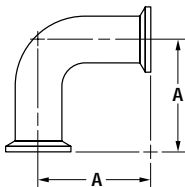
## Blank-Off Flanges



- Stainless steel
- To close off unused parts

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

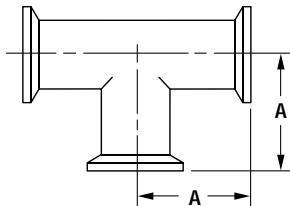
## 90° Elbows



- Stainless steel
- Same size flange on both ports

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

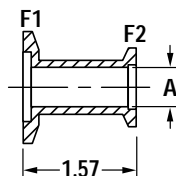
## Tees



- Stainless steel
- Same size flanges on all ports

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

## Reducers



- Makes differing sizes of ISO flanges
- Stainless steel

ISO F1	ISO F2	A	CAT. NO.
NW 25	NW 16	0.555	387121
NW 40	NW 16	0.555	387131
NW 40	NW 25	0.900	387132

Dimensions are in inches

# Exhaust Filters

## Standard Exhaust Filters & Directional Exhaust Filters

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



1417

STANDARD EXHAUST FILTERS				
USE WITH PUMP MODEL	DIMENSIONS, INCHES		CATALOG NUMBER	
	DIAMETER	HEIGHT	FILTER	REPLACEMENT ELEMENT
8890 <sup>1</sup> , 8905, 1399, 1400, 1400N	2.5	2.5	1417	1417L
8907, 8912, 8917	2.5	4.5	1417P-7	1417R
8920, 8925, 1376, 1402, 1405, 1402N, 1376N	5.0	6.25	1417P-10	1417G
1397, 1374	5.0	9.0	1417P-20	1417H-01
8917A-80, 8947C-80	2.5	4.5	1417P-7	1417R

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



1417A

- 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.

DIRECTIONAL EXHAUST FILTERS						
USE WITH PUMP MODEL	DIMENSIONS, INCHES			CATALOG NUMBER		
	DIAMETER	HEIGHT	OUTLET TUBE O.D.	FILTER	ELEMENT	GASKET REPLACEMENT
8907, 8912, 8917, 8920, 8925, 1376, 1380, 1402, 1405, 1402N, 1376N	5.0	7.5	1.0	1417A	1417G	1417A-01
1374, 1397	6.5	10.0	2.0	1417B	1417H	1417B-01
1400				1417C-02		

## 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.<sup>1</sup> 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.

CAT. NO.	VACUUM PUMP MODEL NO.
1416B	8890 (GEM)
1416H	8905
1416C	8907, 8912, 8917, 8920, 8925
1416H-01	1400, 1400N
1416C-01	1376, 1376N, 1402, 1402N, 1405

1. CAUTION: Two stage vane vacuum pumps such as models 8905, 8907, 8912, 8920, 8917, 8925, 1400, 1402, 1376, 1405, 1400N, 1402N and 1376N should not be operated continuously at pressures above 10 Torr.

## Hermetically Sealed Oil Mist Eliminators



When attached to an effective exhaust line, the hermetically sealed oil mist eliminator prevents corrosive vacuum pump exhaust gases from escaping into the room. It also 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. Dimensions of cat no. 1416D: 5" W x 7-3/4" H; 1416F, 5" W x 13-3/8" H. 1416D exhaust port accepts 13/16" I.D. hose.

USE WITH PUMP MODEL	CATALOG NUMBER		
	MIST ELIMINATOR	PUMP ADAPTER KIT	REPLACEMENT ELEMENT
1400N	1416D	1416E-01	1417Y-05
1402N, 1376N	1416D	1416E-02	1417Y-05

# Foreline Traps

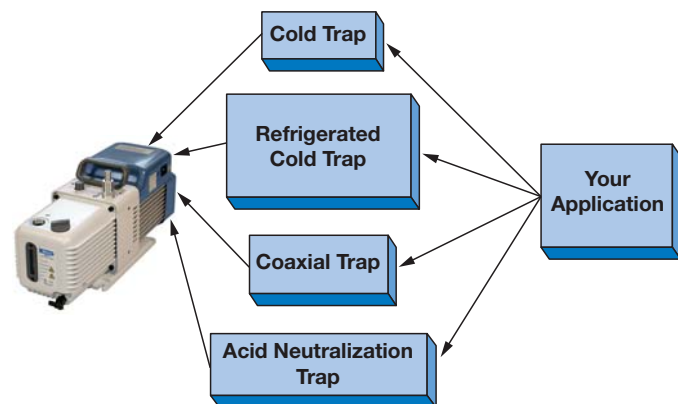
Foreline traps are used to prevent harmful substances generated or resident in vacuum systems from damaging vacuum pumps and/or your work:

## PROTECT YOUR VACUUM SYSTEM

### Pump Damage

Liquid water, solvents, and acids can cause serious damage to a vacuum pump:

- Vapors can condense to liquids within vacuum pump as a natural result of gas compression
- Liquid can be accidentally aspirated into the pump
- Particulates can become lodged in a pump mechanism



## PROTECT/IMPROVE YOUR VACUUM APPLICATION

### Oil Backstreaming

Oil molecules can migrate from an oil lubricated vacuum pump back into the vacuum system when operated at sustained vacuum levels of  $1 \times 10^{-2}$  Torr ( $1.33 \times 10^{-2}$  mbar) or deeper for long periods.

### Pump Shutoff Back Migration

When a vacuum pump is shut off, contamination (oil, line substances) can back up into your work if unprotected by pump/system anti-suckback devices and traps.

### Pump Efficiency

Cold traps lower vapor pressure, enabling higher vacuum with the same work from the pump.

TRAP SELECTION TABLE					
Potential Pump Contaminants	Coaxial Trap	Acid Neutralization Trap <sup>1</sup>	Cold Traps		
			Ultra Low Refrigerated (-100°C)	Dry Ice Slurry (-79°C)	Liquid Nitrogen (-198°C)
Water	Not Recommended	Not Recommended	Excellent	Excellent	Excellent
Organics	Not Recommended	Not Recommended	Excellent	Excellent	Excellent
Acidic	Not Recommended	Excellent	Fair	Fair	Excellent
Oil Backstreaming <sup>2</sup>	Excellent	Not Recommended	Excellent	Excellent	Excellent

### Key

Excellent
Fair
Not Recommended

### Notes:

1. Limits Pressure to  $10^{-2}$  Torr
2. Prevents pump oil from contaminating Application during prolonged deep vacuum or pump shutoff.

## Dry Ice/Liquid Nitrogen Cold Trap



- Recommended for freeze dryers, vacuum manifolds, concentrators, etc.
- Dry ice slurry cold temperature maintained for up to 12 hours<sup>1</sup>
- Liquid nitrogen cold temperature maintained up to 2 hours<sup>1</sup>
- Easy to maintain

**DRY ICE/LIQUID NITROGEN COLD TRAP** has a large 3qt refrigerant well to extend effective cold trapping time. Flow-through design captures up to 1.5L condensate. The transparent ring allows visual monitoring of the trapping surface while the system is operating.

Note 1: Trap's cold temperature time will be less with a high vapor load.

TUBING NEEDED	DIAM.	HEIGHT	DIAMETER	IN/OUT OFFSET	TRAP CAT. NO.	REPL. SEAL CAT. NO.
7/16 I.D.	10	8.25	10.75	3.5	1420H-14	545210

Tubing cat. no. 331040-5

# Foreline Traps

## Ultra Cold Refrigerated Trap (-100°C)



**New**

- Saves the labor and expense of recharging dry ice/LN2 traps
- Reduces the risk of pump failure caused by neglect of recharging dry ice/LN2 trap
- Protects oil-sealed high vacuum pumps from corrosive organic vapors

Specifications	Catalog No. 1440H-01 <sup>1</sup>
Maximum low temperature	-100°C
Solvent trapping capacity	300 ml
Bath volume	1.3 L
Power	115V, 60 Hz, 500 watts
Dimensions LxWxH in.(cm)	16.5 x 20 x 18.8(42 x 51 x 47.5)
Weight, lbs(kg)	103.4(47)

Notes:

1. Support/clamp set for glass trap; also order cat. no. 1420H-21

**Available  
Q1, 2007**

## Coaxial Traps



- ISO NW flange connection
- Reduces oil backstreaming
- Stainless steel construction
- Easy replacement of elements
- Element must be ordered separate from trap
- One way flow

ISO SIZE	CAPACITY	DIAM.	HEIGHT <sup>1</sup>	CAT. NO.
NW 16	To 4 CFM (140 L/min)	3.75	8.25	541001
NW 25	To 12 CFM (340 L/min)	5.50	8.25	541002
Stainless steel element for ISO NW 16 Trap				541921
Stainless steel element for ISO NW 25				541922

1. Distance between ISO NW inlet and outlet connections.

## Acid Neutralization Trap



- ISO NW flange connection
- Calcium Hydroxide element
- Element changes from white to bluish-transparent when spent
- Configure with prior cold trap to reduce loading

ISO SIZE	CAPACITY	CATALOG NUMBER		
		TRAP	REPLACEMENT ELEMENT	PUMP CONNECTOR KIT FOR TRAP <sup>1</sup>
NW 16	To 2 CFM (57L/min)	1420H-21	1420E-02	1420K-16
NW 25	To 12 CFM (340L/min)	1420H-20	1420E-01	1420K-25

1. Includes hinge clamp, centering ring and elbow. Use with CHEMSTAR<sup>®</sup> vacuum pumps.

### Application Note for 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; 3. Remove the center well and plexiglass 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.



# Vacuum Controllers & Foot Switches

## LABAID™ - Programmable Vacuum Controller For Walkaway Automation



- Rack mountable to save hood space
- Works with most PTFE dry pumps
- Easy to program and operate
- Includes Self-Cleaning and patent pending vacuum control

New LabAid™ Programmable Controller automates Welch DRYFAST® PTFE dry pumps or any brand dry pump with flow up to 70 L/min for vacuum within the range 1 Torr (1.3 mbar) to Atmosphere. The controller and pump combination creates an effective system for rotary evaporation, distillation, and other solvent evaporation procedures.

- Enter evaporation control parameters via the keypad or call up one of the five user stored programs and walk away. Stored programs can have one or two vacuum levels with different run times. One-touch function keys stop bumping/foaming, go to maximum vacuum, and vent to atmosphere.
- Avoid the “sawtooth” control profile of “vacuum on – vacuum off” controllers. LabAid responds to changes in application vacuum instantly with variable air bleed or vacuum to hold pressure levels absolutely steady. Patent pending.
- The Self-Cleaning function provides an automated fresh air purge for your pump at the conclusion of your programmed procedure. This removes residual vapor that could condense in the pump, damaging pump surfaces and impairing pump efficiency. Self-Cleaning and precision vacuum control reduce repairs by extending the life of diaphragms and valves. Pump shuts off at conclusion of cleaning cycle.

CAT. NO.	DESCRIPTION*
1640B-01	LabAid Programmable Controller, 115V, 60Hz
1640C-02	LabAid Programmable Controller 230V, 50 Hz

Note 1: Includes liquid separator w/easy access jar.

For Rotary Evaporator Applications, See p. 6-9

## On/Off Foot Switch



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

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 connections, 8 Ft. Cord, CE and plugs directly into the IEC connection on the pump.

PUMP MODEL	CAT. NO.
2010, 2012, 2022, 2030, 2015, 2017,	1430A (115V/60 Hz only, maintained On/Off)
2021, 2031, 2511, 2515, 2522, 2534,	1430B (115V/60 Hz only, momentary On/Off)
2546, 2561, 2567, 2581, 2585	1430C (90-230V with IEC connections, momentary On/Off)

# Vacuum Regulators & Controllers

## Vacuum Regulators



1422A Bench Mount



1421, 1421C & 1421D Pump Mount

PUMP MODEL	CAT. NO.
2010, 2012, 2022, 2030, 2015, 2017 2021, 2031, 2561, 2567, 2581, 2585	1422A
2012	1421C
2022, 2030, 2015 2017, 2010, 2021, 2031	1421D
8890	1421

Model 1422A connects to pump intake via hose for easy regulation of vacuum level. Position on bench top. Corrosion resistant construction. Requires 1/4 in. (7 mm) ID hose (cat. no. 331030-5).

Model 1421 & 1421D replaces inlet barb and allows easy regulation of vacuum level. Includes an easy to read dial gauge. Cat. No. 1421C-stainless steel-Brass Construction. Cat. No. 1421D-All stainless steel construction. Cat. No. 1421-Brass Construction.

**CAUTION:** Do not use with DuoSEAL®, CHEMSTAR® or Direct-Drive pumps.

## Distillation Controller for Rotary Evaporator



1600B-01

- Vacuum control to  $\pm 1$  Torr
- 3 position control switch
- No mercury, 100% solid state

### AUTOMATIC VACUUM CONTROLLER

The automatic vacuum controller (AVC) is an economical, easy-to-use solid state device for controlling vacuum level in any brand of rotary evaporator. The controller maintains a selected set-point with a digital read-out of the pressure in Torr (mm Hg). Vacuum level may be set from 1 Torr to atmospheric pressure. The vacuum controller is compatible with any vacuum source from a water aspirator, PTFE diaphragm pump, house vacuum or oil-sealed rotary vane pump.

The controller consists of three key components all located within the controller housing.

- **Stainless steel pressure sensor** – measures the pressure in the rotary evaporator.
- **Process controller** – compares reading from the sensor with the pressure set point entered.
- **Stainless steel solenoid control valve** – controller signals valve to open above pressure set point and close.

The controller is easy to set up. First, connect the vacuum source to the hose connector 1/4 in. (7mm) I.D. marked inlet and then connect the rotary evaporator to the 1/4 in. (7 mm) I.D. hose connector marked outlet. Set-up is now complete.<sup>1</sup> Dimensions: 8.75" L x 5.4" W x 3.6" H (22.2 x 13.7 x 9.1 cm). Weight: 3.2 lbs. (1.5 kg).

### COMPUTER CONTROLLED AVC

The controller is available with a built in serial communication card (RS232) for data logging and control from a remote PC. Windows software (cat. no. 1710A) is needed to run the vacuum pressure display, logging and remote control from a PC.

CAT. NO.	DESCRIPTION <sup>1</sup>
1600B-01	AVC Distillation Controller, 115V, 60Hz
1620B-01	AVC Distillation Controller with built in serial communication card, 115V, 60Hz
1710A	Required with Model 1620, Windows software for vacuum pressure display, logging and remote control

# Vacuum Gauges

## Handheld General Range Vacuum Gauge



Model 1520 in optional frame case

Kit 1520K-10

- Accurate vacuum measurement from 1 to 760 Torr
- Portable unit connects quickly to any vacuum source

Take fast, easy vacuum measurements at multiple locations with this portable vacuum gauge. The internal piezoelectric sensor reads results to a large LCD. Stands upright using optional protective frame case. 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" W x 1-1/4" D x 5-3/4" H. Available as standalone unit or in convenient carrying case kit with frame case / stand, battery, AC adapter, and vacuum hosing length.

Cat. No.		Range	Description
Meter	Meter w/ Kit		
1520B-01	1520K-10 <sup>1</sup>	1 to 760 Torr	Handheld Vacuum Gauge, 9 V, Torr
1520C-02	1520K-11 <sup>2</sup>	1 to 1013 mBar	Handheld Vacuum Gauge, 9 V, mBar

Notes: 1. 120 VAC adapter.  
2. 220 VAC Euro adapter

## Handheld Mid-High Vacuum Gauge



Available Q1, 2007

- Accurate vacuum measurement from 0.1 to 1999 millitorr
- Portable unit connects quickly to any vacuum source

Take accurate vacuum readings at multiple sites using this portable vacuum gauge. The external thermocouple sensor reads results to a large LCD. Stands upright using optional protective frame case. Sensor coil cord extends from 1 to 4 feet to connect vacuum source using 1/8" NPT fitting. Operates on standard 9V battery or using AC adapter. Meter dimensions: 3-5/8" W x 1-1/4" D x 5-3/4" H. Available as standalone unit with thermocouple tube sensor or in convenient carrying case kit with frame case / stand, battery, AC adapter, and thermocouple tube sensor<sup>1</sup>.

Cat. No.		Range	Description
Meter	Meter w/ Kit		
1525B-01	1525K-10 <sup>2</sup>	0.1 to 1999 millitorr	Handheld Torr Vacuum Gauge
1525C-02	1525K-11 <sup>3</sup>	0.001 to 2.665 mBar	Handheld Vacuum Gauge

Notes: 1. For replacement sensor, order 1525A.  
2. 120 VAC adapter.  
3. 220 VAC Euro adapter

## Thermocouple Vacuum Gauge

- Vacuum measurement to low millitorr (micron) range
- Rugged, reliable thermocouple gauge sensor tube



Gauges provide an accurate, reliable measurement of vacuum. Self-contained gauges with solid-state electronics for rapid response time, long life and low maintenance. Comes with a 0 to 10 VDC recorder output. The gauge sensor tubes are designed to assure maximum sensitivity over the entire vacuum range. Gauge sensor tube connected to system via 1/8" NPT thread. Each gauge comes with one sensor tube and one cable. Dimensions of 7" L x 5" D x 5.6" H (17.8 x 12.7 x 14.1); Weight 2 lbs(0.9 kg).

Gauge CAT. NO.	Range(millitorr)	Voltage	Protective Trap CAT. NO.	Replacement Sensor Tube CAT. NO.
1515	0 to 5000	115V, 60Hz 1 Ph	1515B	1515A

## Dial Pressure & Vacuum Gauge



Dial Diameter	Units of Measure	Connection	CAT. NO.
2 in. O.D.	in. Hg, cm Hg (Brass)	1/8" male NPT	726021
2 in. O.D.	Pascal (Brass)	1/8" male NPT	726022
2.5 in. O.D.	in. Hg, mm Hg (Brass)	1/4" male NPT	726020
2 in. O.D.	in. Hg (Stainless)	1/8" male NPT	726023
2 in. O.D.	mbar/kPa (Brass)	1/8" male NPT	726024
2 in. O.D.	psi/kgsm	1/8" male NPT	726025
2 in. O.D.	kPa/psi	1/8" male NPT	726026

Inexpensive gauge for measuring vacuum level. Not an absolute pressure gauge. Gauge uses atmospheric pressure as reference.

# Vacuum Pump Oils & Hose Adapter Kits

## 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.

CAT. NO.	8995G-11	8995G-15	8995G-20
SIZE	Liter	Gallon	5 Gallon

## 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 enables direct-drive vacuum pumps to maintain the highest vacuum performance over time. The oil is light yellow.

CAT. NO.	8995P-11	8995P-15	8995P-20
SIZE	Liter	Gallon	5 Gallon

## DuoSEAL® Vacuum 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.

CAT. NO.	1407K-11	1407K-15	1407K-20
SIZE	Quart	Gallon	5 Gallon

## Hose Adapter Kits



1420H-01

- 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	1/4 and 3/8	1420H-12
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, 8907, 8912, 8917, 8920, 8925	13/16	1/4 and 3/8	1420H-02

# Service Kits

## Chemical Duty Dry PTFE Diaphragm Pumps - DRYFAST & DRYFAST Ultra



Pump Model	Kit. No.	Description
2032	2047K-01	One head service kit
2034	2037K-01	One head service kit
2037	2037K-01	One head service kit
2042	2047K-01	One head service kit
2044	2037K-01	One head service kit
2047	2047K-01	One head service kit

## Self Cleaning Chemical Duty Dry Vacuum System



Pump Model	Kit. No.	Description
2025	2025K-01	One head service kit
2026	2027K-01	One head service kit
2027	2027K-01	One head service kit
2028	2047K-01	One head service kit

## Standard Duty Dry Piston Pump Kits



Pump Model	Kit No.	Description
2522	2522K-01 2522K-03	Service Kit One Head Service Kit, 2522
2534	2534K-01 2534K-03	Service Kit One Head Service Kit, 2534
2546	2546K-01 2546K-03	Service Kit One Head Service Kit, 2545
2522, 2534, 2545, 2546	2522K-04 2522K-05 2522K-06 2522K-07 2522K-08 2522K-09	Seal Service Kit Vacuum Reg Kit, in. Hg/cm Hg Pressure Reg Kit, kPa/psi Vacuum Reg Kit, kPa/mbar Vacuum Reg Kit, kPa/in. Hg Pressure Reg Kit, psi/cm Hg
2580, 2585	2585K-01 2585K-02 2585K-03 2585K-04	Connecting Rod Assembly Valve Plate Assembly Two Head Service Kit, 2585 Seal Service Kit, 2585
2562/2567	2567K-03 2567K-04	Two Head Service Kit, 2562 Seal Service Kit, 2562
2561	2561K-03 2561K-04	Two Head Service Kit, 2561 Seal Service Kit, 2561
2581	2581K-03 2581K-04	Two Head Service Kit, 2581 Seal Service Kit, 2581
All Models WOB-L® Dry Pump	2500K-04	Service Kit for Feet



# Service Kits

## Chemical Duty Dry PTFE Diaphragm Pumps



Pump Model	Kit. No.	Description
2010	2010K-01	One head service kit
2012, 2015, 2022	2022K-01 2025K-01	One head service kit, S/N <EG040000 One head service kit, S/N >EG050000
2016, 2024, 2030	2025K-01	One head service kit
202501	2025K-01 2025K-02 2025K-06	One head service kit Tubing service kit for 202501, S/N <EC091299 Tubing service kit for 202501, S/N >EC091300
2021, 2031	2027K-01	One head service kit
202601, 202701	2027K-01 2025K-06	One head service kit Tubing service kit

## GELMASTER™ Vacuum System



Pump Model	Kit No.	Description
142601	1426K-01 1426K-02	Diaphragm repair kit Major repair kit

## DUOSEAL® Vacuum Pumps



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

## CHEMSTAR® Vacuum Pumps



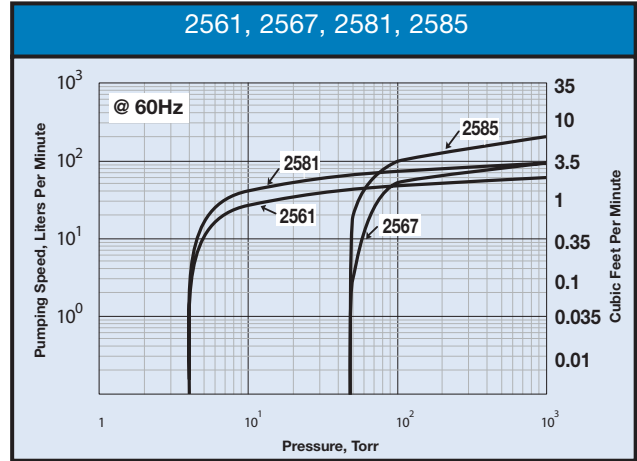
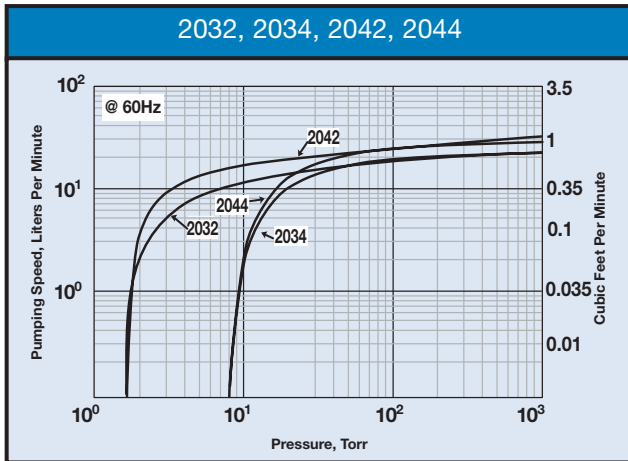
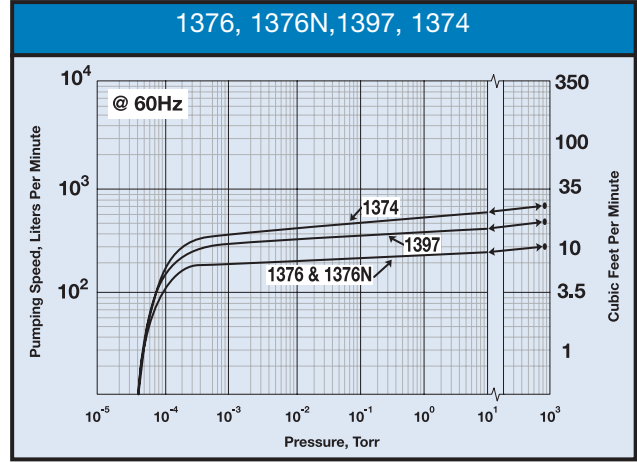
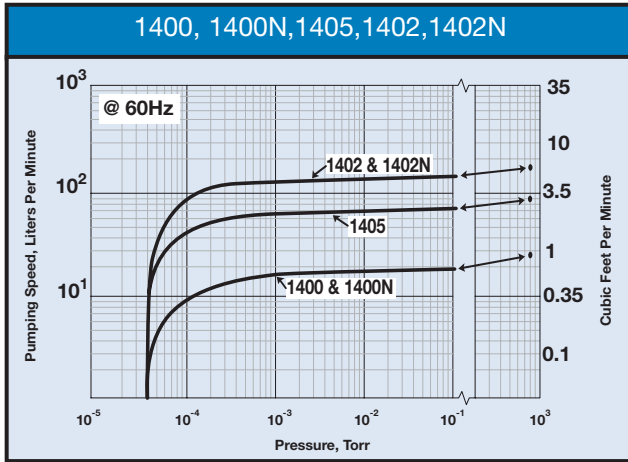
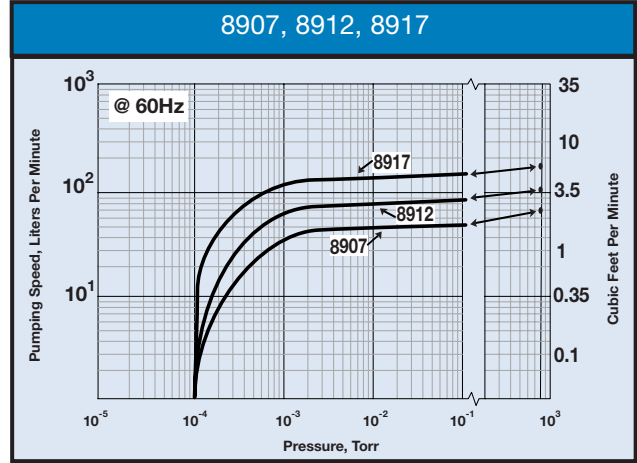
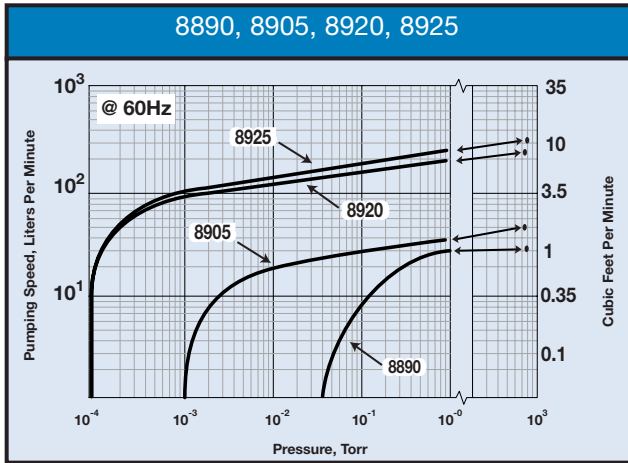
Pump Model	Kit No.	Description
1400N	1400K-09 1400K-10	Minor repair kit, ChemSTAR 1400N Major repair kit, ChemSTAR 1400N
1402N	1402K-09 1402K-10	Minor repair kit, ChemSTAR 1402N Major repair kit, ChemSTAR 1402N
1376N	1376K-09 1376K-10	Minor repair kit, ChemSTAR 1376N Major repair kit, ChemSTAR1376N

## Direct-Drive Vacuum Pumps



Pump Model	Kit No.	Description
8890	8890K-02	Minor repair kit, 8890
8905	8905K-02 8905K-03	Minor repair kit, 8905 Shaft seal repair kit, 8905
8907, 8912, 8917	8917K-04 8917K-05	Minor repair kit, 8907, 8912, 8917 Shaft seal repair kit, 8917
8920	8915K-02	Minor repair kit, 8920
8925	8925K-02	Minor repair kit 8925

# Pumping Speed Curves



# Product Directory by Type, Flow & Vacuum

## Chemical Duty Dry Vacuum Pumps & Systems

Model	Free Air Displacement CFM(L/min) @ 60Hz	Ultimate Pressure, Torr(mbar)	Page (Type)
2010	0.45(12.7)	110(146)	22 (Pump)
2012	0.78(22)	100(133)	22 (Pump)
2034	0.9(25)	9(12)	22 (Pump)
2032	0.9(25)	2(2.7)	22 (Pump)
2044	1.2(35)	9(12)	22 (pump)
2042	1.2(35)	2(2.7)	22 (pump)
2025	1.2(35)	9(12)	23 (Dial Vacuum Read-out System)
2026	1.2(35)	2(2.7)	23 (Dial Vacuum Read-out System)
2027	1.2(35)	2(2.7)	23 (Digital Absolute Vacuum Read-out System)
2028	1.2(35)	2(2.7)	23 (Programmable w/ Digital Vacuum Read-out System)
2037	1.8(50)	50(67)	22 (pump)
2047	2.5(70)	35(47)	22 (pump)

## Standard Duty Dry Vacuum Pumps

Model	Free Air Displacement CFM(L/min) @ 60Hz	Ultimate Pressure, Torr(mbar)	Maximum Deliver Pressure, PSIG(pascal)	Page (Type)
2511	0.39(11)	219(292)	33(3.3 x 10 <sup>5</sup> )	24, 25 (Pump, aspiration/filtration systems)
2515	1.2(34)	70(93)	0	25 (Aspiration/filtration systems)
2522	0.76(22)	100(133)	100(10 <sup>6</sup> )	24 (Pump w/liquid trap, silencer, pressure & vacuum regulators)
2534	1.2(34)	70(93)	50(5 x 10 <sup>5</sup> )	24 (Pump w/liquid trap, silencer, pressure & vacuum regulators)
2546	1.6(45)	60(80)	100(10 <sup>6</sup> )	24 (Pump w/liquid trap, silencer, pressure & vacuum regulators)
2561	2.1(60)	5(6.7)	0	24 (Pump w/liquid trap, silencer, vacuum regulator)
2581	3.5(100)	5(6.7)	0	24 (Pump w/liquid trap, silencer, vacuum regulator)
2567	3.5(100)	60(80)	0	24 (Pump w/liquid trap, silencer, vacuum regulator)
2585	7.1(201)	60(80)	0	25 (Pump w/liquid trap, silencer, vacuum regulator)

## Compact Direct-Drive High Vacuum Pumps

Model	Free Air Displacement CFM(L/min) @ 60Hz	Ultimate Pressure, Torr(mbar)	Page (Type)
8890	1.1(31)	1x10 <sup>-1</sup> (1.33x10 <sup>-1</sup> )	26
8905	1.8(51)	2x10 <sup>-3</sup> (2.7x10 <sup>-3</sup> )	26
8907	2.6(73)	1x10 <sup>-4</sup> (1.3x10 <sup>-4</sup> )	26
8912	3.8(108)	1x10 <sup>-4</sup> (1.3x10 <sup>-4</sup> )	26
8917	6.1(173)	1x10 <sup>-4</sup> (1.3x10 <sup>-4</sup> )	26
8920	7.7(218)	3x10 <sup>-4</sup> (4x10 <sup>-4</sup> )	26
8925	11.3(320)	4x10 <sup>-4</sup> (5.3x10 <sup>-4</sup> )	27
Rotovap Pump	1.1(31)	1x10 <sup>-1</sup> (1.33x10 <sup>-1</sup> )	27
Freeze Dryer Pump	6.1(173)	1x10 <sup>-4</sup> (1.3x10 <sup>-4</sup> )	27

## Rugged DUOSEAL® Belt-Drive High Vacuum Pumps

Model	Free Air Displacement CFM(L/min) @ 60Hz	Ultimate Pressure, Torr(mbar)	Page (Type)
1400	0.9(25)	1x10 <sup>-4</sup> (1.3x10 <sup>-4</sup> )	30
1399	1.2(35)	1.5x10 <sup>-2</sup> (1.9x10 <sup>-3</sup> )	31
1399N	1.2(35)	1.5x10 <sup>-2</sup> (1.9x10 <sup>-3</sup> )	31 (w/bell jar plate)
1405	3.2(90)	1x10 <sup>-4</sup> (1.3x10 <sup>-4</sup> )	30
1402	5.6(160)	1x10 <sup>-4</sup> (1.3x10 <sup>-4</sup> )	30
1376	10.6(300)	1x10 <sup>-4</sup> (1.3x10 <sup>-4</sup> )	30
1397	17.7(500)	1x10 <sup>-4</sup> (1.3x10 <sup>-4</sup> )	30
1374	23(650)	1x10 <sup>-4</sup> (1.3x10 <sup>-4</sup> )	31

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### Mail:

Gardner Denver Thomas, Inc.,  
Welch Vacuum Technology  
5621 W. Howard St.  
Niles, IL 60714

### Payment Terms:

Net 30 days with approved credit; Mastercard, Visa or American Express are accepted for your convenience.

Minimum Order: \$50.00

### From Welch in the U.S.A and Canada:

To order your vacuum pumps, parts and accessories:

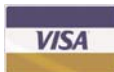
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**Business Hours:** 8:00 a.m. to 4:30 p.m. Central Time



## 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](http://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 new (limited 1 year) warranty. A nominal fee is assessed for equipment that is inspected but not repaired at the Customer's discretion.

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### For Repair Service Inquiry:

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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 Vacuum Technology, a business unit of Gardner Denver Thomas, Inc. @ (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](http://www.welchvacuum.com)

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USA, Canada, Latin America  
Gardner Denver Thomas, Inc.,  
Welch Vacuum Technology  
5621 W. Howard St.  
Niles, IL 60714 USA  
Phone: 847-676-8800  
Fax: 847-677-8606  
Email: [welchvacuum@rtpumps.com](mailto:welchvacuum@rtpumps.com)

Asia  
Rietschle Thomas Asia Pacific, Ltd.  
Unit 2503, Metropole Square  
No. 2 On Yiu St., Siu Lek Yuen  
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Fax: 852 2792 4598  
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Welch Vacuum Technology products are manufactured at ISO9001 registered plants in Sheboygan, WI and Monroe, LA.