

# Rugged Belt Drive Vacuum Pumps | DUOSEAL®



**Model  
1400**

**Models  
1405 / 1402**

**Model  
1376**

**Models  
1397 / 1374**

## Specifications

## Two-Stage Vacuum Pumps

| Model  | 1400                               | 1405                               | 1402                               | 1376                         | 1397                           | 1374                            |
|--|------------------------------------|------------------------------------|------------------------------------|------------------------------|--------------------------------|---------------------------------|
| Free Air Displacement                          |                                    |                                    |                                    |                              |                                |                                 |
| cfm  | 0.9                                | 3.2                                | 5.6                                | 10.6                         | 17.7                           | 23                              |
| l/min.   | 25                                 | 90                                 | 160                                | 300                          | 500                            | 650                             |
| Ult. Vac. Pressure, torr (mbar) <sup>1,2</sup> | $1 \times 10^{-4}$ (0.00013)       | $1 \times 10^{-4}$ (0.00013)       | $1 \times 10^{-4}$ (0.00013)       | $1 \times 10^{-4}$ (0.00013) | $1 \times 10^{-4}$ (0.00013)   | $1 \times 10^{-4}$ (0.00013)    |
| Gas Ballast                                    | Yes                                | Yes                                | Yes                                | Yes                          | Yes                            | Yes                             |
| Discharge Pressure (PSIG)                      | ---                                | ---                                | ---                                | ---                          | ---                            | ---                             |
| Pump RPM                                       | 580                                | 525                                | 525                                | 525                          | 400                            | 510                             |
| Motor Horsepower (watts)                       | 1/3 (250)                          | 1/2 (370)                          | 1/2 (370)                          | 1 (750)                      | 1 (750)                        | 1-1/2 (1120)                    |
| Oil Capacity, qt.(liters)                      | 0.62 (0.59)                        | 2.25 (2.1)                         | 2.25 (2.1)                         | 2.5 (2.4)                    | 1.25 (1.2)                     | 1.25 (1.2)                      |
| Tubing Needed, I.D. in.                        | 7/16 (11)                          | 7/16 (11)                          | 13/16 (21)                         | 13/16 (21)                   | 1-5/8 (41)                     | 1-5/8 (41)                      |
| Intake, Nipple Thread                          | 3/4-20                             | 1-20                               | 1-20                               | 1-20                         | 1.75-20                        | 1.75-20                         |
| Exhaust, Thread Type                           | 3/4-20                             | 1-20                               | 1-20                               | 1-20                         | 1.75-20                        | 1.75-20                         |
| Weight, lbs. (kg)                              | 58 (26)                            | 112 (51)                           | 112 (51)                           | 156 (71)                     | 205 (93)                       | 220 (100)                       |
| Overall Dimensions<br>LxWxH in.(cm)            | 17.8x9x12.6<br>(45.1x32.1x31.8)    | 20x12x15<br>(51x30.5x60)           | 20x12x15<br>(51x30.5x60)           | 20x14.1x15.4<br>(51x35.9x39) | 26x13.7x18.8<br>(66x34.8x47.6) | 26x13.7x18.8<br>(66x34.86x47.6) |
| Ship Weight, lbs. (kg)                         | 70 (31.8)                          | 132 (60)                           | 132 (60)                           | 180 (81.8)                   | 213 (96.8)                     | 215 (97.7)                      |
| Shipping Carton Dimensions<br>LxWxH in.(cm)    | 20.5x13.8x14.5<br>(52.1x35.1x36.8) | 22.5x15.5x19.5<br>(57.2x39.4x49.5) | 22.5x15.5x19.5<br>(57.2x39.4x49.5) | 22x18x19<br>(55.9x45.7x48.3) | 27.3x18x22<br>(69.3x45.7x55.9) | 27.3x18x22<br>(69.3x45.7x55.9)  |

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

|  |          |          |          |          |          |                       |
|--|----------|----------|----------|----------|----------|-----------------------|
| Wired for 115V, 60Hz, 1 Ph with N. American 115V Plug      | 1400B-01 | 1405B-01 | 1402B-01 | 1376B-01 | 1397B-01 | 1374B-01 <sup>5</sup> |
| Wired for 230V, 60Hz, 1 Ph with N. American 230V Plug      | 1400C-01 | 1405C-01 | 1402C-01 | ---      | ---      | ---                   |
| Wired for 220V, 50Hz, 1 Ph w/Cont. Euro. (Schuko) Plug     | 1400C-02 | 1405C-02 | 1402C-02 | 1376C-03 | 1397C-03 | ---                   |
| Explosion Proof Motor, 115V, 60 Hz                         | 1400W-01 | 1405W-01 | 1402W-01 | ---      | ---      | ---                   |
| 3-Phase Motor 230V, 460V, 60Hz                             | ---      | ---      | 1402M-01 | 1376M-01 | 1397M-01 | 1374M-01              |
| Wired for 115V, 60Hz, 1 Ph with N. American 115V Plug, CSA | 1400B-80 | 1405B-80 | 1402B-80 | ---      | 1397B-80 | ---                   |

## Applications

|                                   | page    |
|-----------------------------------|---------|
| 1. Freeze Drying                  | 17      |
| 2. Glove Box                      | 26      |
| 3. Vacuum Manifold / Schlenk Line | 11      |
| 4. Vacuum Ovens                   | 23      |
| 5. Refrigeration Servicing        | 24 - 29 |

### DuoSEAL Pumps

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

### Refrigeration Servicing Pumps

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



### Notes:

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

# Rugged Belt Drive Vacuum Pumps | DUOSEAL<sup>®</sup>, CAPTURE



**Model  
1399N**



**Model  
1402B-46**



**Model  
1376B-46**



**Model  
CRR-1A**

| One-Stage Vacuum Pumps<br>w/o plate |                                    | One-Stage Vacuum Pumps<br>w/bell jar plate | Refrigeration Servicing Pumps  |                                |                                     | CAPTURE Refrigerant<br>Recovery |
|-------------------------------------|------------------------------------|--|--------------------------------|--------------------------------|-------------------------------------|---------------------------------|
| 1399                                | 1399N                              | 1402B-46                                   | 1376B-46                       | 1397B-46                       | CRR-1A                              |                                 |
| 1.2                                 | 1.2                                | 5.6  | 10.6                           | 17.7                           | 10.6                                |                                 |
| 35                                  | 35                                 | 160  | 300                            | 500                            | 300                                 |                                 |
| 1.5 x 10 <sup>-2</sup> (0.019)      | 1.5 x 10 <sup>-2</sup> (0.019)     | 1 x 10 <sup>-4</sup> (0.00013)             | 1 x 10 <sup>-4</sup> (0.00013) | 1 x 10 <sup>-4</sup> (0.00013) | 3x10 <sup>-2</sup> (0.04)           |                                 |
| No                                  | No                                 | Yes  | Yes                            | Yes                            | ---                                 |                                 |
| ---                                 | ---                                | ---  | ---                            | ---                            | 30                                  |                                 |
| 750                                 | 750                                | 525  | 525                            | 400                            | 525                                 |                                 |
| 1/3 (250)                           | 1/3 (250)                          | 1/2 (370)                                  | 1 (750)                        | 1 (750)                        | 1 (750)                             |                                 |
| 0.5 (0.47)                          | 0.5 (0.47)                         | 2.25 (2.1)                                 | 2.5 (2.4)                      | 1.25 (1.2)                     | 2.5 (2.4)                           |                                 |
| 7/16 (11)                           | 7/16 (11)                          | 13/16 (21)                                 | 13/16 (21)                     | 1-5/8 (41)                     | ---                                 |                                 |
| 3/4-20                              | 3/4-20                             | 1-20                                       | 1-20                           | 1.75-20                        | 1 NPT                               |                                 |
| 3/4-20                              | 3/4-20                             | 1-20                                       | 1-20                           | 1.75-20                        | 1 NPT                               |                                 |
| 51 (23)                             | 63 (28.6)                          | 112 (51)                                   | 156 (71)                       | 205 (93)                       | 122 (55.4)                          |                                 |
| 17x9x10<br>(43.x22.9x25.42)         | 17x9x10<br>(43.x22.9x25.42)        | 20x12x15<br>(51x30.5x60)                   | 20x14.1x15.4<br>(51x35.9x39)   | 26x13.7x18.8<br>(66x34.8x47.6) | 19.25x12.3x11.1<br>(48.9x31.3x28.1) |                                 |
| 62 (28.2)                           | 74 (33.6)                          | 132 (60)                                   | 180 (81.8)                     | 213 (96.8)                     | 136 (61.8)                          |                                 |
| 20.5x13.8x14.5<br>(52.1x35.1x36.8)  | 20.5x13.8x14.5<br>(52.1x35.1x36.8) | 22.5x15.5x19.5<br>(57.2x39.4x49.5)         | 22x18x19<br>(55.9x45.7x48.3)   | 27.3x18x22<br>(69.3x45.7x55.9) | 22x14.8x18<br>(55.9x37.6x45.7)      |                                 |
| 1399B-01                            | 1399N-01                           | 1402B-46                                   | 1376B-46                       | 1397B-46                       | CRR-1A                              |                                 |
| ---                                 | ---                                | ---  | ---                            | ---                            | ---                                 |                                 |
| 1399C-02                            | ---                                | 1402C-46                                   | 1376C-46                       | 1397C-46                       | CRR-1B                              |                                 |
| ---                                 | ---                                | ---  | ---                            | ---                            | ---                                 |                                 |
| ---                                 | ---                                | ---  | ---                            | ---                            | ---                                 |                                 |
| ---                                 | 1399B-80                           | ---  | ---                            | ---                            | ---                                 |                                 |

- All 115V and 230V single phase motors include thermal overload protection.
- Models 1400C-02, 1405C-02 and 1402C-02 provided with CE marking.
- Conduit wiring installation required. No cord, plug or switch provided.
- CSA approved models are 1400B-80, 1405B-80 and 1402B-80.

**DuoSeal™ Vacuum Pump Oil**  
Tested to high vacuum levels, this oil meets rigid requirements for vapor pressure, stability and viscosity.

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



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



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

## For a Complete System

| Component                     | page    |
|-------------------------------|---------|
| • Traps                       | 69      |
| • Inlet / Exhaust Accessories | 69 - 71 |
| • Fittings / Hose             | 66 - 68 |
| • Gauges                      | 76 - 77 |
| • Regulators / Controllers    | 75 - 76 |
| • Service Kits                | 81      |
| • Oil                         | 72 - 73 |

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

## Rugged Rotary Vane Design

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

## Lubrication System

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

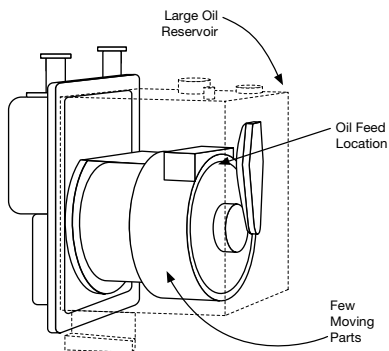
## Key Accessories

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

## The Five Defining Features Needed For Pumping Corrosive Gases

### 1. High Contamination Tolerance

- Contaminants diluted
- Fewer moving parts
- Top oil feed for cleaner oil



### 2. Vital Parts Corrosion Resistant

- Fluoroelastomer seals and gaskets
- PTFE
- Stainless Steel
- Nickel Plated or Anodized
- Chemical Resistant Grade of Cast Iron

### 3. Reduced Frictional Wear

- Less than 580 RPM vs. typical 1750 RPM direct drive

### 4. Nitrogen Purge Standard

- Degasses and cools oil

### 5. Easy Attachment of Accessories

- Complete accessory package for corrosive gases

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



**Model 1402N**  
Specifications & Ordering - See Below

| Specifications  |                                 |                                 |                                |
|---|---------------------------------|---------------------------------|--------------------------------|
| Model   | 1400N                           | 1402N                           | 1376N                          |
| Free Air Displacement                                   |                                 |                                 |                                |
| cfm (l/min.)@60 Hz                                      | 0.9                             | 5.6                             | 10.6                           |
| m <sup>3</sup> /hr (l/min.)@50 Hz                       | 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 <sup>5</sup>                | NW 16                           | NW 25                           | NW 25                          |
| Overall Dimensions LxWxH in.(cm)                        | 17.8x9x12.6 (45.2x22.9x32)      | 19.3x14.1x15.4 (49x35.3x39.1)   | 19.3x12.3x15.6 (49x31.2x39.6)  |
| Weight, lbs.(kg)  | 58(26)                          | 112(51)                         | 156(71)                        |
| Ship Weight, lbs.(kg)                                   | 71(32.3)                        | 133(60.5)                       | 181(82.3)                      |
| Shipping Carton Dimensions LxWxH in.(cm)                | 20.5x13.8x14.5 (52.1x35.1x36.8) | 22.5x15.5x19.5 (57.2x39.4x49.5) | 22x18x19 (59.5x45x48)          |
| Ordering Information <sup>2, 4</sup>                    |                                 |                                 |                                |
| Wired for 115V, 60Hz, 1 Ph w/N. American 115V Plug      | 1400N-01                        | 1402N-01                        | 1376N-01                       |
| Explosion Proof Motor 115V, 60Hz, 1 Ph                  | 1400N-90 <sup>3</sup>           | 1402N-90 <sup>3</sup>           | ---                            |
| Wired for 230V, 60Hz, 1 Ph w/ N. American Plug          | ---                             | 1402N-60                        | 1376N-60                       |
| Wired for 220V, 50Hz, 1 Ph w/ Cont. Euro. (Schuko) Plug | 1400N-50 <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.