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Find the *Systec ZHCR* at our website: *Click HERE*

Product Data Sheet

Systec® ZHCR®

Vacuum Pump and Controller

The Systec ZHCR (Zero Hysteresis / Constant Run) vacuum pump is designed for membrane degassing of the HPLC mobile phase. Employing a patented closed-loop, micro-stepping, RPM control-strategy permits the pump to run with continuously variable speed, providing quick pull-down at high RPM, and then sustaining a consistent vacuum level at low RPM.

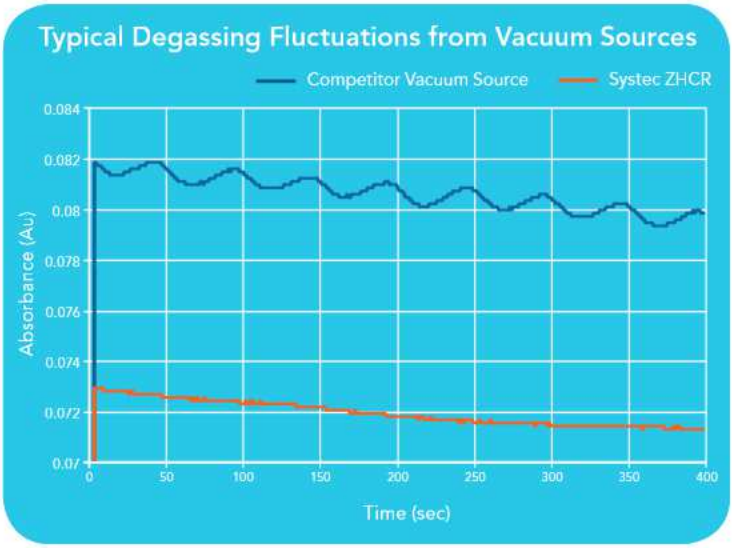


- Patented control eliminates baseline fluctuations
- Inert flow path
- 5+ year lifetime
- Built-in anti-backflow check valves
- Compact

Fluctuations in detector baseline due to changes in vacuum level are eliminated by not having to repeatedly stop and start a single-speed pump. This also greatly reduces wear and noise.

The brushless motor enables quiet operation and is appropriate for environments where solvent vapors may be present.

Flowpaths are entirely inert and the continuously purged head design allows the pump to start into a full vacuum – vacuum will not be released in the event of a power loss.



*Fluctuations in detector baseline of a single-speed pump compared to the patented technology of the Systec ZHCR vacuum pump.**
UV detector baseline fluctuations are minimal when compared to traditional stop and start vacuum sources.

*Vacuum chamber consists of 480 µL of Systec AF tubing: flow rate is 1 mL/min, eluent is methanol; wavelength is 215 nm.

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Vacuum Pump Technical Data

Air Flow (no vacuum):
- 650 SCCM @ 400 RPM; 45 SCCM @ 60 RPM

Vacuum Level:
- <40 mmHg @ 60 RPM (1 SCCM air flow)

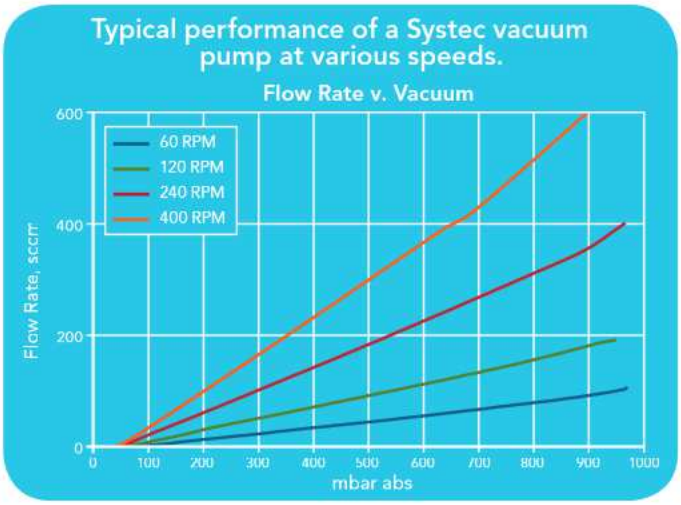
Pump-down Time:
- <1 minute (with 4 MINI degassing channels, 50cc total internal chamber volume)

Pump Head Continuous Purge Air Flow Rate:
- 1 SCCM, Primary; 9 SCCM, Secondary

Wetted Materials:
- Polypropylene, PTFE, EPDM Rubber

Noise:
- <52 dB (@ 50 dB ambient)

Expected Lifetime:
- >5 years (continuous run @ 60 RPM)



Electrical Specifications: Stepper Motor

Type:
- Uni-Polar, 1 Amp @ 4.6V DC / phase; 200 steps / rev.

Drive:
- Micro-stepped, control current set to 425 mA / phase avg. current

Chop Frequency:
- Approximately 25 kHz

Speed:
- Continuously Variable. Ranges from 1 RPM to 450 PRM, depending on the deviation from vacuum setpoint in closed-loop control.

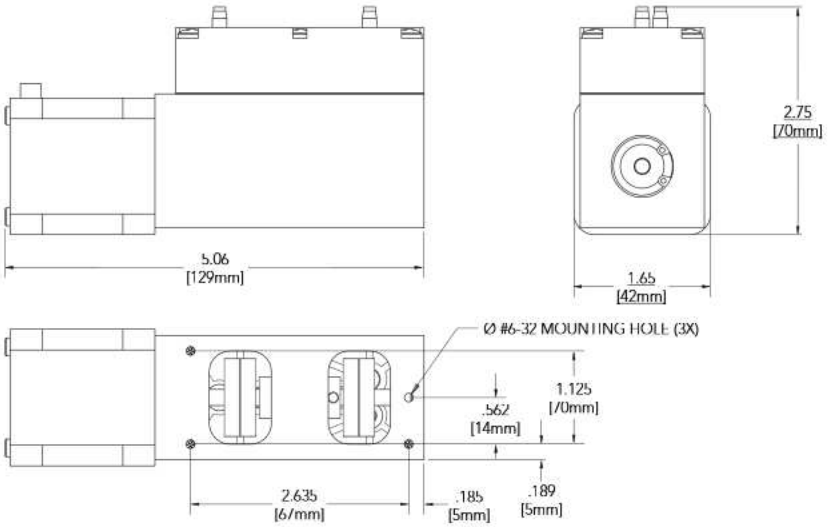
Power Requirement

- 15-24V DC: <5 watts Typical
- 10 watts peak
- Overcurrent Protection Device: 1.10 Amp Hold, 2.20 Amp Trip at 20 °C

Temperature

- <25 °C rise above ambient with ambient <50 °C in open air
- The 5 watts of heat dissipated will cause varying temperature rise in conditions other than open air.
- The maximum rated temperature of the pump is 75 °C

Vacuum Pump Dimensions / Mounting



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Pump Control Specifications

Power Requirements:

- 15-24V DC; <5 watts typical, 10 watts peak.

Vacuum Sensor Calibration Accuracy (NIST Traceable):

- ±0.5% of reading ±2 mmHg absolute over an ambient operating temperature range of 10-35 °C.

Vacuum Validation Output:

Speed

- 5mV DC / 0.13 kPa (1 mmHg) absolute from 2.7 to 106.7 kPa (20 to 800 mmHg) (0.100V DC @ 2.7 kPa (20 mmHg); 4.000V DC @ 106.7 kPa (800 mmHg)).

Accuracy

- ±1.0% of reading ±0.010V DC from 20 to 800 mmHg over an ambient operating temp. range of 10-35 °C.

Pump Speed Monitor Output (Test Point on P.C. Board):

Signal

- 5mV DC / 1 RPM from 10 to 450 RPM (0.050V DC @ 10 RPM; 2.250V DC @ 450 RPM).

Accuracy

- ±3.0% of reading over an ambient operating temp. range of 10-35 °C.

Closed-Loop Control Setpoint:

- 6.7 kPa (50 mmHg) absolute (pump runs at high RPM until near setpoint, then speed is varied to maintain a value of 6.7 kPa absolute – load independent).

LED Indicators:

LED 1 (Green)

- Power on

LED 2 (Yellow)

- Solid on = Normal operation, vacuum level >13.3 kPa (100 mmHg)
- Flashing on 1 sec. / off 2 sec. = Vacuum sensor signal error (Error Code 4 – see below).
- Flashing on 1 sec. / off 1 sec. = Operational error (Codes 1-3).

LED 3 (Green)

- Normal operation, vacuum within acceptable operating range.

Errors Detected:

1 – Pumpdown

- Unable to reach 13.3 kPa (100 mmHg) in 5 minutes.

2 – High RPM

- Vacuum (mmHg) × motor speed (RPM) >6000 for more than 2 min. in the running state.

3 – Low RPM

- Motor speed <10 RPM in the running state

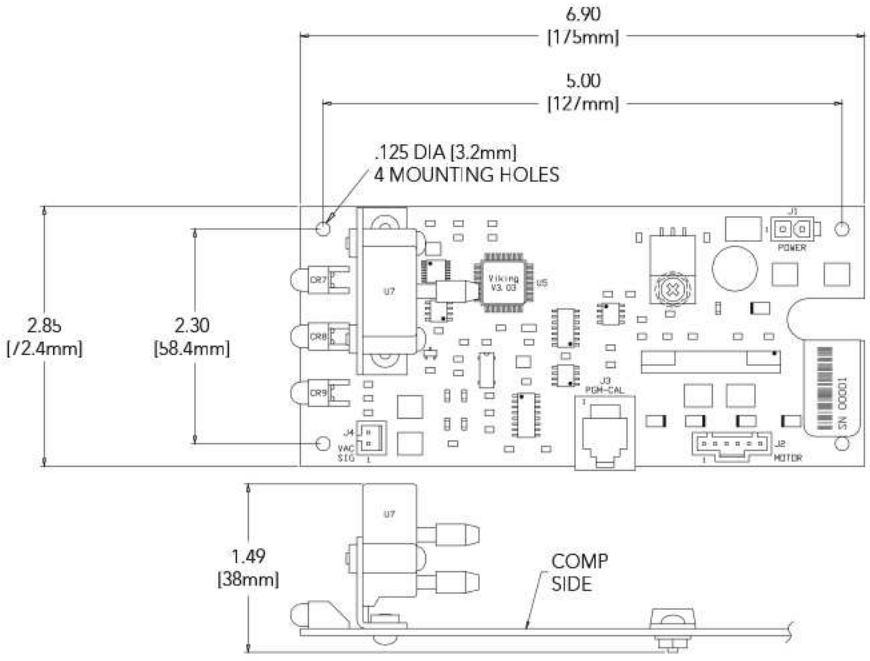
4 – Sensor Signal

- Sensor signal >106.7 kPa (800 mmHg) or sensor signal <1.3 kPa (10 mmHg)

Communications:

- RS-232 communication to a PC is available as an accessory, with enabled communication firmware and customized PC software.

Control P.C. Board Dimensions / Mounting



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Available Configurations

Vacuum Controller

Systec Part Number	Vacuum Pump Control Type	Vacuum Level (kPa/mmHg Absolute)	Vacuum Control Type	LED Indicators
9000-1056	Analytical	6.7 / 50	Closed Loop	3
9000-1054	Analytitcal	N / A*	Open Loop	3
9000-1057	Preparative	10.7 / 80	Closed Loop	3

* Pump down at 400 rpm for 10 min, maintains 60 rpm.

Pump / Controller Assembly

Systec Part Number	Vacuum Pump Control Type	Vacuum Level (kPa/mmHg)	Vacuum Control Type	LED Indicators	Frame Type	Max. # of Vacuum Chambers
0001-6290	Analytical	6.7 /50	Closed Loop	3	L-Bracket	8

Vacuum Pumps

Systec Part Number	Vacuum Pump Control Type	Max Air Flow† (SCCM)
9000-1471	Analytical	3 @ 6.7 kPa Vacuum
9000-1472	Preparative	10 @ 10.7 kPa Vacuum

†CH_3CN is in all degassing channels. Air flow will be improved with other solvents.

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