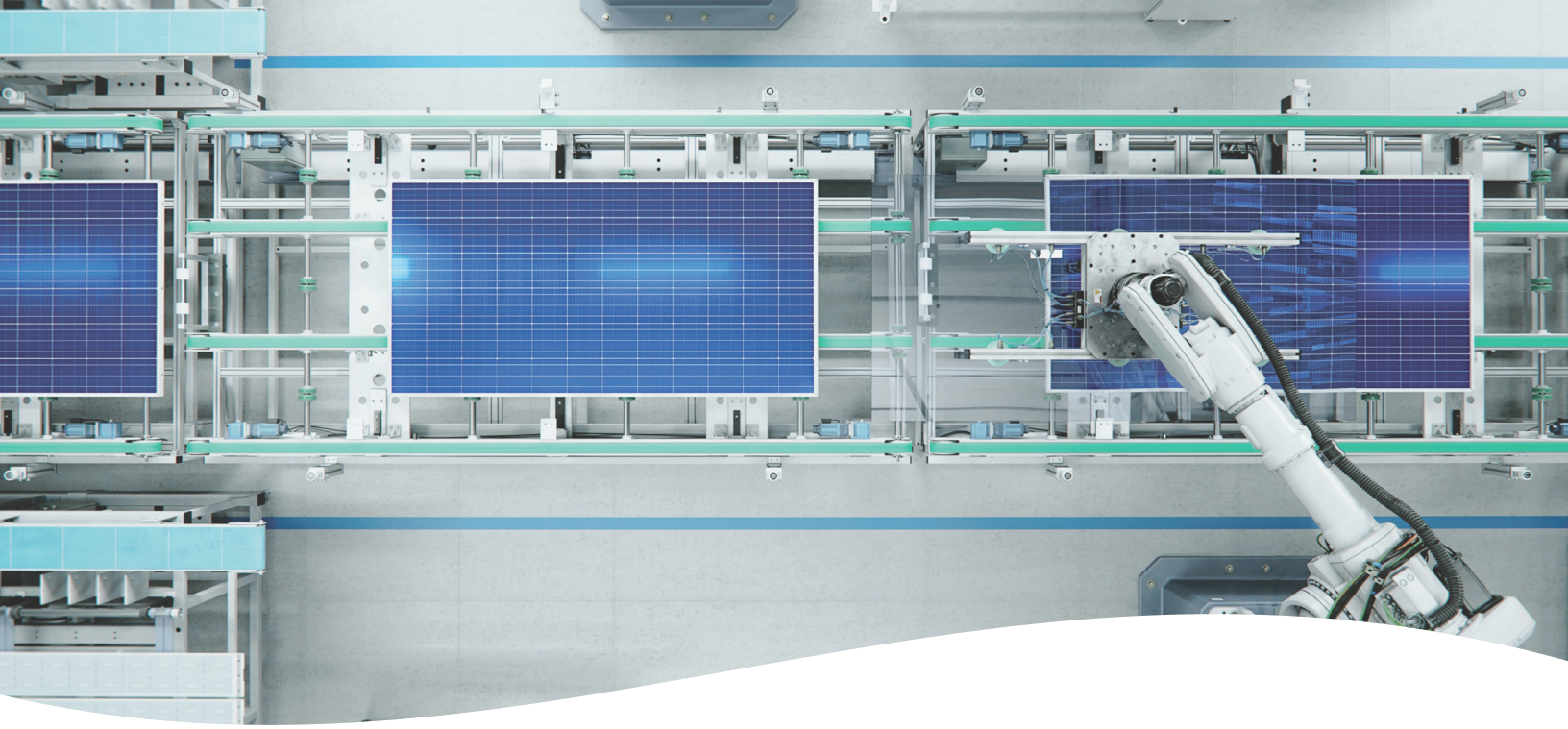
FLOWSERVE

SIHI® Boost GB A

Dry-running vacuum pump

Deep vacuum performance with
less energy and maintenance

Experience In Motion



Deep vacuum with less power and maintenance

The SIHI Boost GB A dry-running vacuum pump is an innovative unit offering unique performance and cost advantages in glass-coating processes as well as other chemical and industrial applications.

Even with a step-down ratio of 50:1 to the backing pump, the unit delivers significantly faster vessel evacuation than any other booster unit in the industry. A single unit can easily replace two or three Roots-type blowers — plus any interstage cooling units they might require — and deliver superior performance, even when paired with smaller backing pumps.

In addition, the SIHI Boost pump consumes less electricity in a smaller footprint.

The SIHI Boost advantage

No other manufacturer offers the revolutionary performance of SIHI Boost dry-running vacuum pumps:

Higher differential pressure

- Up to 250 mbar versus 20 to 50 mbar for standard Roots-type pumps
- 10 times faster pumping speed than any other two-stage vacuum system
- Smaller, less complex backing pumps
- Deep vacuum level down to 10^{-4} Torr

Higher shaft speed (15,000 rpm)

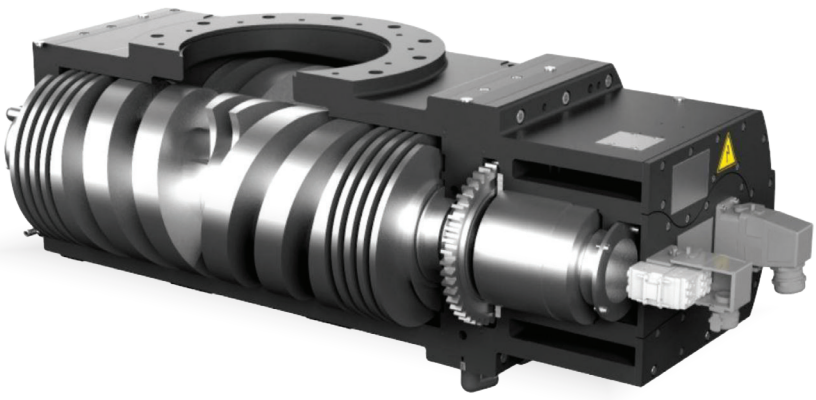
- Superior performance in a smaller footprint
- Significantly shorter pump evacuation and cycle times

More efficient compression

- Lower power consumption
- Virtually silent operation
- Designed to eliminate axial and radial forces

Minimal maintenance and downtime

- No oil of any kind
- No rotating shaft or wearing seals
- Fast in-situ service on-site
- Condition monitoring replaces preventive maintenance



Faster cycle times with less energy

The unique design of the SIHI Boost vacuum pump allows the unit to harvest kinetic energy stored in the spindles, which can be exposed to atmospheric pressure at their full speed of 15,000 rpm — five times faster than traditional Roots-type machines — with less electricity. Twin screws and symmetrical spindles produce an even distribution of forces, with compression to both ends of the booster.

Quiet, oil-free operation

Unlike Roots-type blowers, which use oil-lubricated gearboxes to achieve synchronization, SIHI Boost pump spindles are electronically synchronized. This innovative design enables quiet, vibration-free operation while eliminating the needs for lubrication and costly mechanical seals. Contact-free operation extends component life and allows wider tolerances, significantly reducing the chance of shutdowns caused by liquid or particulate carryover.

Versatile performance in a smaller footprint

An integrated pressure-relief system allows the SIHI Boost vacuum pump to be used with smaller backing pumps while still achieving rapid pump-down times, further reducing utility consumption. Deep process pressure, as well as load-lock applications, can be realized with almost any roughing pump technology, including liquid ring, rotary piston and dry screw vacuum pumps.

All these innovations combine to produce a booster that provides dramatically faster evacuation down to deep vacuum levels with less power, a smaller footprint, plus quieter, safer and cleaner operation.

Application flexibility

Like all Flowserve products, SIHI Boost pumps are designed for simple operation and long-term reliability in a wide variety of applications and industries. Available for both classified and non-classified areas.

Key applications

- Industrial vacuum
- Thin film deposition
- Batch coating
- Inline coating
- Roll-to-roll coating
- Load lock
- PECVD/PVD
- Test chambers
- Vacuum furnace VD/VOD
- Vacuum welding

Key industries

- Architectural glass
- High-barrier films
- Lighting/deco/optics
- Photovoltaic
- Flat-panel display
- Secondary metallurgy
- Heat treatment
- Medical
- Laboratory
- Aerospace

Industry-leading performance and operation

The SIHI Boost pump design is unique to the industry, delivering significant advantages traditional Roots-type blowers simply can't provide.

Fast evacuation in a space-saving design

SIHI Boost vacuum pumps provide a compression ratio (K0) of up to 100,000:1, which is exponentially higher than the rate of the highest-performing Roots-type blower (maximum 75:1). A single compact SIHI Boost pump can replace two or three conventional units while eliminating the need for interstage cooling. In addition, the unit can be oriented horizontally or vertically, eliminating unnecessary pipework by allowing a direct connection to the vacuum chamber.

Design for vertical and horizontal direction of flow allows direct connection to vacuum chamber.

Increased productivity and product quality

High pump-down speed with kinetic energy recovery optimizes your cycle times at high pressures. At low pressure, remarkably high pump speed enables a higher flow rate of process gases and better ultimate pressure. Zero process contamination is ensured by truly dry operation, which prevents any contact with service liquids and eliminates the need for gear oil.

Greater process control

SIHI Boost pumps feature a double-pitched, twin-fluted spindle design, which creates deep vacuum with much shorter screws. This reduces temperature changes over the length of the screw while enabling greater temperature control overall. The non-contacting screw spindle design also gives you a substantially wider range of performance, enabling the unit to operate at vacuum levels conventional Roots-type blowers are unable to provide.

Low power consumption

A proprietary spindle design makes the SIHI Boost pump the most energy-efficient booster on the market. Additional savings are made possible by an integrated drive, which enables the operator to optimize electrical consumption.

Reliably handles harsh processes

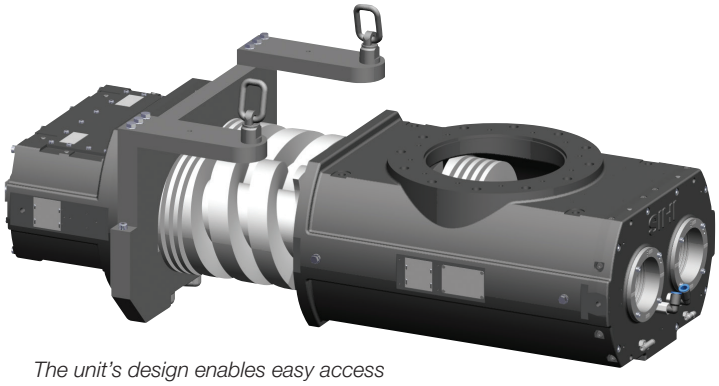
No filters are required for SIHI Boost pumps to handle particle or liquid carryover. When mounted for vertical flow, the unit's top-down design prevents deposits from building up inside the pump, and particles don't cause wear, since there are no contacting parts.

- Because the unit absorbs process particles, it can be paired with liquid ring vacuum backing pumps.
- Integrated liquid cleaning is made possible with an optional flushing module.
- An integrated gas dilution module can be equipped to enable particle carryover and pump drying.

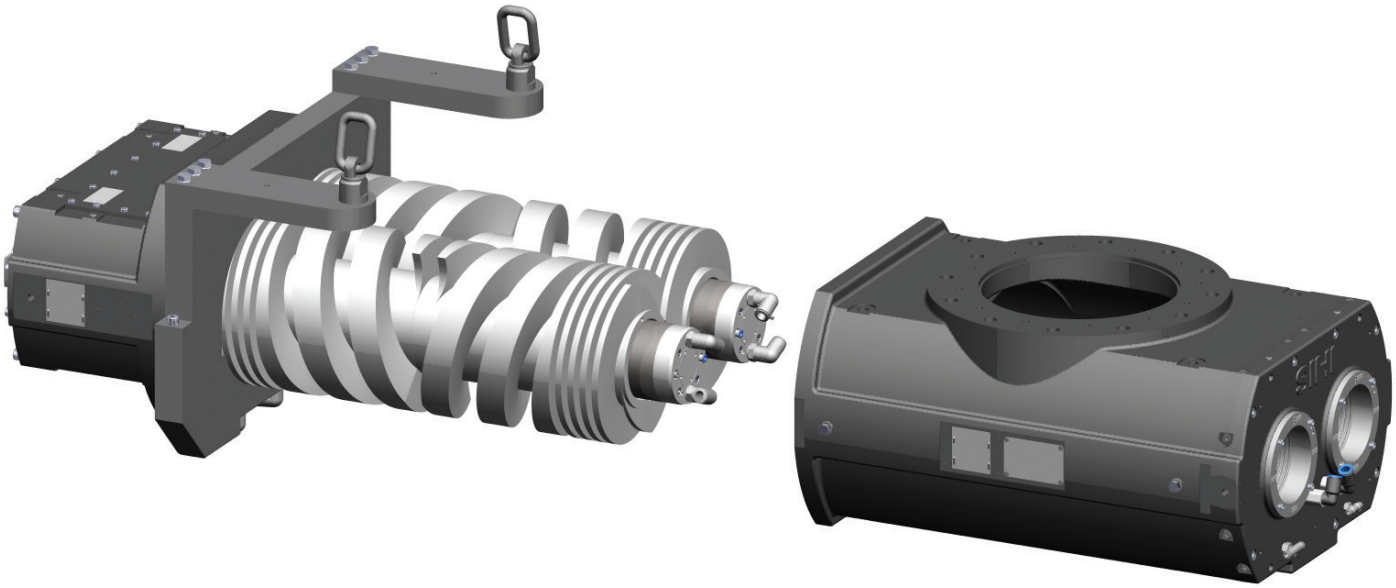
These three options also make the SIHI Boost pump ideal for handling condensable and corrosive media.

Easy on-site service

Standard spindle exchange modules enable fast, on-site maintenance by your own staff. The unit can be easily disassembled without removing the bearings. There's no need to remove the pump or send it to a workshop.



The unit's design enables easy access to the booster pump for on-site service.



Low maintenance and downtime

The SIHI Boost vacuum pump is completely free of oil sealing and uses no gearbox oil. As a result, it requires no oil checks, exchanges or disposals. The unit's touchless design principle features long-life bearings, with no wearing parts or rotating shaft seals.

Moreover, the SIHI Boost pump provides continuous real-time status monitoring. Independent data logging of both shafts determines when cleaning is required. In addition, intuitive failure codes alert your team to potential issues before they become more significant problems.

Quiet operation

Contact-free design makes the SIHI Boost vacuum pump the quietest booster on the market: less than 65 dB (A). No acoustic cover is necessary.

Fastest installation and start-up

The SIHI Boost vacuum pump is equipped with quick "plug-and-pump" process and utility connections, enabling the fastest set-up time in the industry. Pre-engineered modules minimize your engineering time and costs while allowing for easy integration of system components.

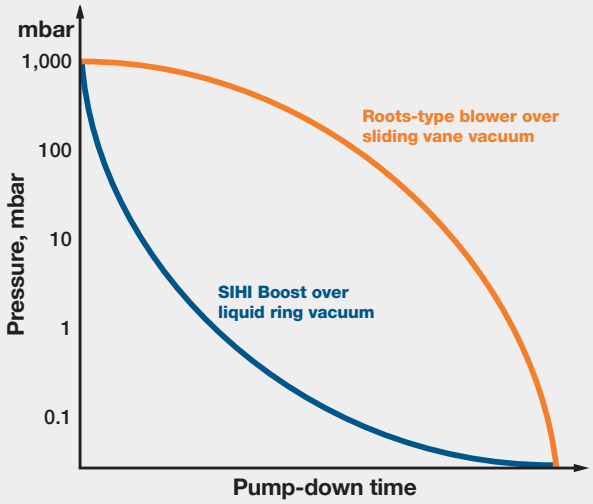
Available accessories

- **Inlet valve —** Enables safe isolation of suction line
- **Inline flush —** Allows liquid cleaning mode on demand without removing pump
- **Gas dilution —** Increases capacity to handle particles or condensable vapor
- **ISO K 160 adaptors —** For connection with ISO K 160 pipework on discharge side
- **Bypass collecting pipe —** Optional bypass manifold for N2.2/N2.3 connections
- **Control unit —** Easy integration with input/output (I/O) interface and all communication standards
- **Power supply connection —** Equips unit with Harting power plugs
- **Cooling water particle filter —** Protects against abrasive particles
- **Service and toolkit —** Enables efficient on-site cleaning of spindles and housing by trained personnel

Performance and technical data

Pump-down time comparison

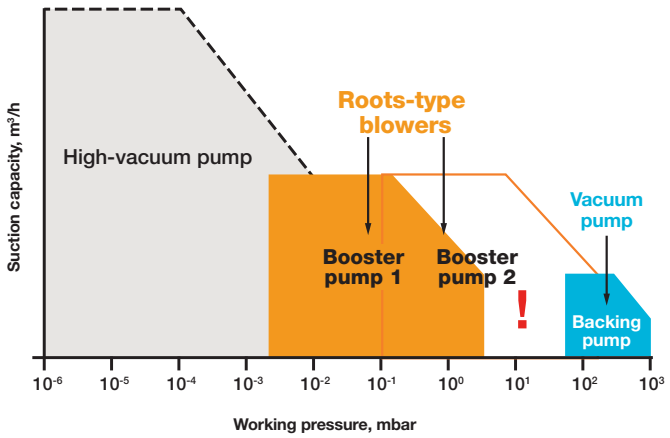
A SIHI Boost vacuum pump over a liquid ring pump requires far less pump-down time to achieve the same vacuum level as a Roots-type blower over a sliding vane pump. This can significantly reduce your cycle times, increasing the productivity and profitability of your process.



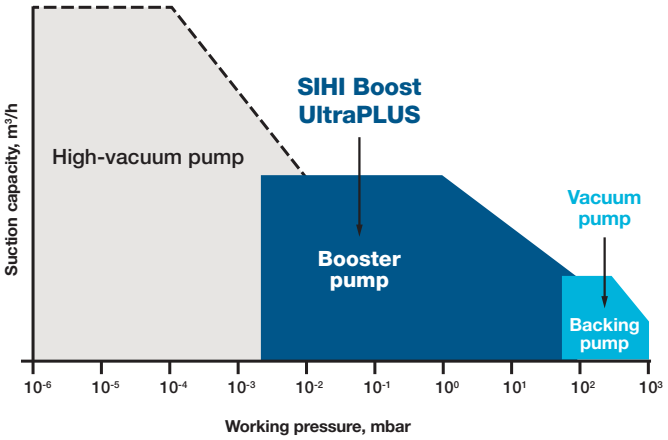
Greater vacuum range

The SIHI Boost vacuum pump offers a greater compression ratio with backing pumps when compared to traditional Roots-type blowers, and can cover a larger vacuum range. This enables you to achieve deep process pressure with just a single compact unit, minimizing space and energy use.

Roots-type blowers



SIHI Boost



General technical data

(Air or N_2 with 0.5 mbar [0.38 Torr] inlet pressure @ 20°C [68°F])

Parameter		SIHI Boost UltraPLUS
Maximum speed at indicated backing pump speed	160 m^3/h (95 cfm)	≤ 5,400 m^3/h (3,180 cfm)
	250 m^3/h (174 cfm)	≤ 5,600 m^3/h (3,300 cfm)
	500 m^3/h (295 cfm)	≤ 5,700 m^3/h (3,350 cfm)
Ultimate pressure		$5x10^{-1}$ to $8x10^{-4}$ mbar a ($3.8x10^{-1}$ to $6x10^{-4}$ Torr a)
Maximum discharge pressure	Static	350 mbar a (263 Torr a)*
	Dynamic	≤ 2,000 bar (29 psi); short, load lock pumping
Noise level, per DIN 9614/ISO 21680		< 65 dB (A)
Weight		1,300 kg (590 lb)

**250 mbar a (188 Torr a) for SIHI Boost UltraPLUS 8001*

Built-in predictive maintenance capability

The SIHI Boost vacuum pump is RedRaven Ready. RedRaven is a predictive maintenance service from Flowserve that improves plant performance by detecting anomalies in pumps, valves and seals, enabling you to predict why your critical assets may experience issues and take preventive action.

The SIHI Boost vacuum pump has been designed and built with all the hardware needed to take full advantage of RedRaven capabilities and benefits. No additional sensors or other devices are required.

RedRaven enables SIHI Boost vacuum pumps to provide clear insights that improve your plant's efficiency, productivity and reliability with a secure IoT platform that includes hazardous area-certified equipment sensors, secure communication, performance analytics and reporting tools — all tailored to your specifications.

Options include:

- **Condition monitoring:** Enables you to capture asset performance data for analysis
- **Predictive analytics:** Helps you identify and diagnose equipment problems before they fail

For more information on RedRaven, contact your Flowserve representative or visit https://www.flowserve.com/redraven

Flowserve Corporation
5215 North O'Connor Blvd.
Suite 700
Irving, Texas 75039-5421 USA

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