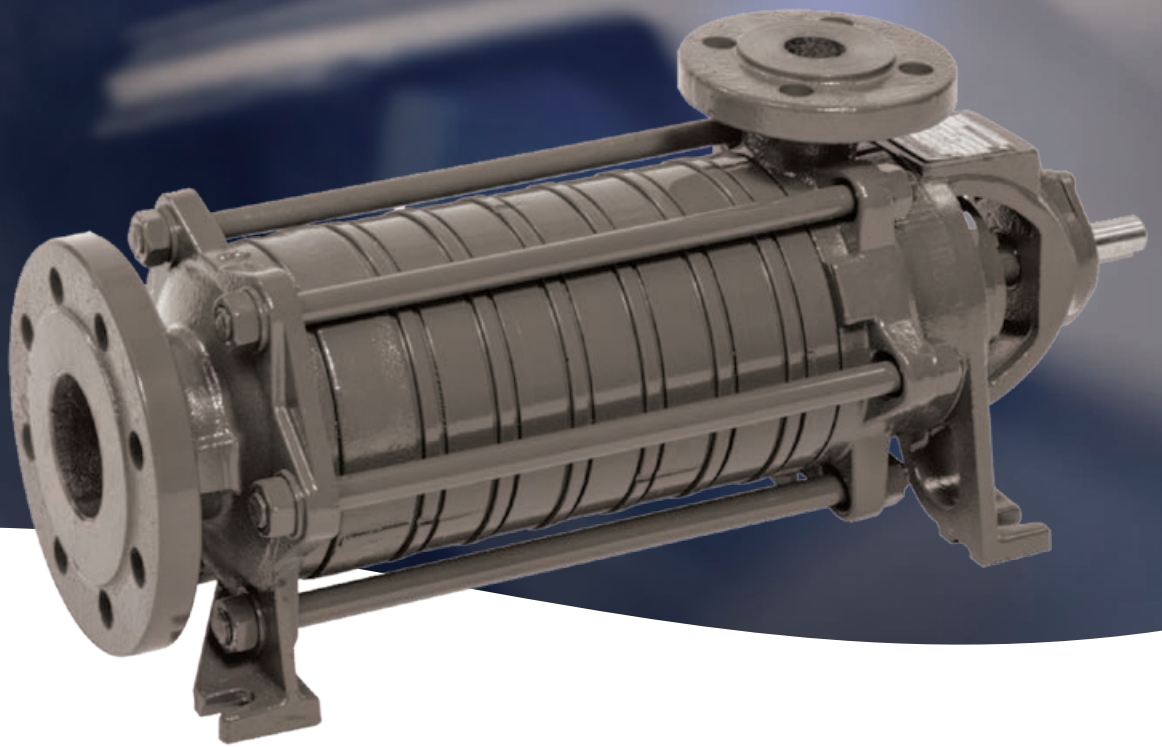




SIHI[®] Side Channel Pumps

High vapor-handling pumps

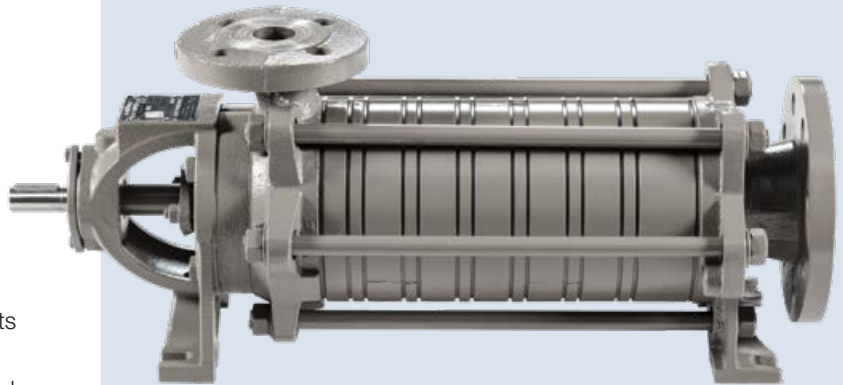
CEH | AEH | AKH | AKL | AKV | AOH



Experience In Motion

Reliably and efficiently handle liquids with as much as 50% vapor

SIHI side channel pumps from Flowserve combine elements of centrifugal and positive displacement technologies to separate and independently handle gas and liquid components through distinctly different pathways. Their ability to handle entrained gases results in a highly efficient system capable of handling liquid/gas mixtures with high vapor content. Unlike centrifugal pumps, which can underperform and air lock with as little as 3% entrained vapor, SIHI's side channel technology accommodates as much as 50% vapor in the suction stream with no ill effects.



SIHI CEH combination pump

Benefits of side channel pumps

Gas handling capability

SIHI side channel pumps will continue to function reliably with gas-entrained fluids — with as much as 50% vapor content — making them ideal for applications where vaporization and two-phase liquids are a consideration. A specialized open vane impeller and sculpted housing (the side channel) separates vapor from liquid via centrifugal force and dynamic agitation. The two media streams are directed separately through the pump body to a common discharge.



Low NPSH performance

By design, Flowserve side channel pumps boast low NPSHR values. CEH models are capable of operating as low as 0.18 m (0.6 ft) without cavitation. (See pages 4–5 for more details.)

Self-priming capability

All SIHI side channel pumps are self-priming once the pump body is filled. This eliminates the need for vacuum or booster pumps in the suction lift application.

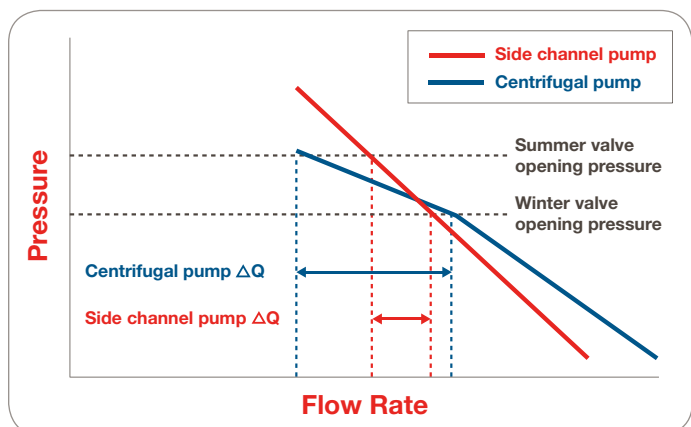
Superior reliability

The self-priming and gas-handling characteristics of side channel pumps ensure safe operation, even with fluids at their vaporization/boiling point. This ensures high levels of safety in a wide variety of industrial processes, even under critical physical conditions.

Steep performance curves

Compared to centrifugal pumps, SIHI side channel pumps have more consistent flow rates in response to differential pressure or temperature variations. This superior performance lowers the total pump operating cost while minimizing the impacts of seasonal and variable discharge conditions.

Performance curve



The Flowserve SIHI difference

With nearly a century of experience engineering SIHI side channel pumps for diverse industries and applications, Flowserve offers you a deeper level of expertise, which is unmatched by any competitor.

- **You'll hear the difference** — SIHI side channel pumps from Flowserve operate at lower noise levels — with a maximum sound pressure level of 68 dB(A), very close to the level of a whisper.
- **You'll see the difference** — Our superior side channel pumps deliver longer operating lifecycles and are built from durable materials to ensure optimal reliability.
- **You'll have more choices** — From pre-engineered process pumps to special purpose units, Flowserve offers a wider range of products and customization options to give you more flexibility and control. For certain types of specialized liquids and operating conditions, we offer the best solutions available in the industry.
- **And you'll get more support** — Whether you're incorporating new materials and technologies or ensuring compliance with changing regulations, Flowserve offers you industry-leading experience and support.

See page 11 to determine which Flowserve SIHI side channel pump is right for your application.

The side channel operating principle

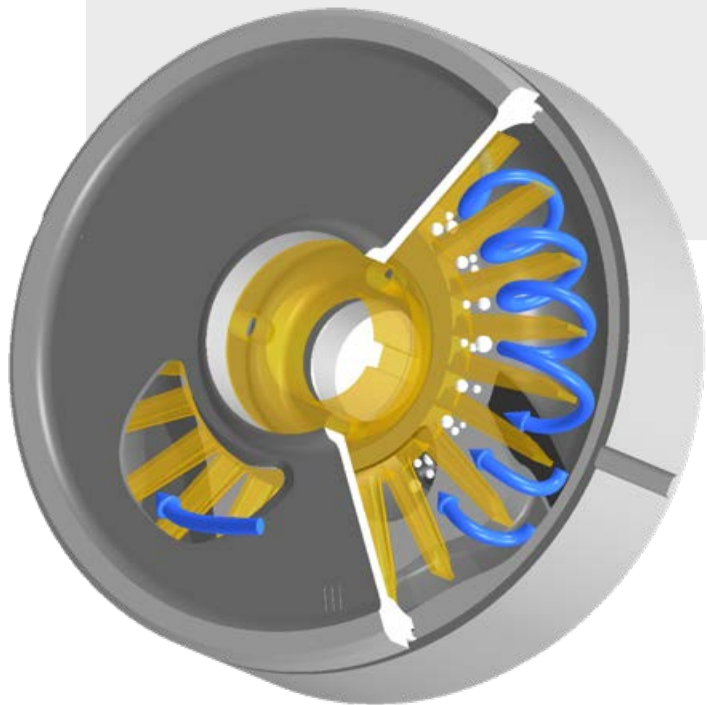
Each stage of a side channel pump is driven by an open-vane wheel impeller housed in a disc-shaped enclosure. This enclosure has a concave channel in the discharge side, referred to as the *side channel*.

Vapor-entrained fluids enter each stage through a suction opening and are centrifuged by the impeller to create a high-pressure, dynamic flow around the side channel, while a low-pressure region is created at the impeller axis.

The high pressure and dynamic, elliptical flow pattern of the liquid within the side channel force gas bubbles to separate out of the mixture. These gas bubbles follow a separate path as they exit through a discharge port, near the lower-pressure axis of the impeller. Gases and liquid continue through separate paths across the pump stages.

Each additional stage increases the pressure. The flow rate is determined by the size of the pump.

A side channel pump is capable of evacuating a suction pipe and can prime the medium independently. A hybrid design, comprised of design elements of both positive displacement and centrifugal pumps, accommodates up to 50% entrained vapor in the liquid stream.



SIHI CEH pumps



Superior vapor handling with low NPSHR

SIHI CEH pumps are engineered to provide trouble-free operation in difficult applications containing high levels of entrained gas and low net positive suction head available.

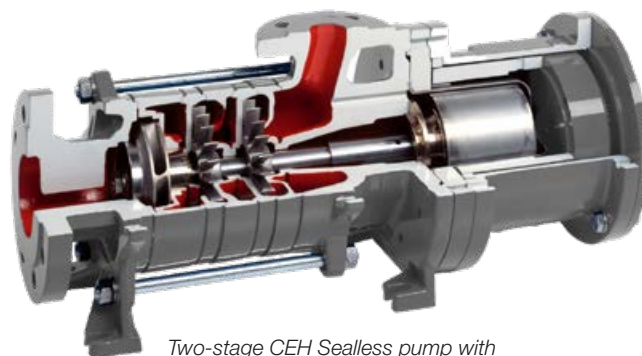
Like all SIHI side channel pumps, SIHI CEH pumps are well-suited for handling liquids near their vapor pressure. The key to the CEH pump's exceptional performance is an integrated first-stage centrifugal pump impeller that makes low-NPSHR operation possible. This combination side channel-centrifugal pump design enables SIHI CEH pumps to move gas-entrained fluids at net positive suction heads less than 0.5 m (1.64 ft).

SIHI CEH pumps will easily handle condensates, refrigerants, boiler feed water, liquefied gases and hydrocarbon fluids. A wide range of products and materials gives you the flexibility to optimize the pump to your requirements.

See page 7 for industry and application details.

Construction

- **Materials:** Cast iron, ductile iron, stainless steel and bronze
- **Shaft sealing:** Gland packing, mechanical sealing (single or double) and magnetic drive



Two-stage CEH Sealless pump with low-NPSH, centrifugal impeller



CEH Sealless pump

Optional seamless coupling configuration

SIHI CEH pumps provide exceptional safety, performance and value. With zero emissions, magnetically coupled pumps ensure compliance with environmental regulations. They also provide superior leak protection for better performance in applications with liquids that are difficult to seal.

Increased uptime with low cost of ownership

By eliminating mechanical seals, magnetically coupled pumps also reduce maintenance time and costs. Resulting benefits include increased uptime, a longer product lifespan and a lower total lifecycle cost.

Secondary containment

Secondary containment is available as an option to magnetic drive functionality. A double-lip sealed chamber outside the pressure containment shell, combined with a pressure sensor, provides a window of safe operation in the unlikely event of a containment shell breach.



CEH Sealless pump with barrel construction

Barrel construction option

For environments requiring increased safety factors, CEH Sealless pumps are available in a barrel casing. For special applications, the casing pressure can be increased to 100 bar (1450 psi). The barrel configuration positions the discharge adjacent to the suction end. The barrel design requires only two sealing points, one at each end of the ring section assembly.

SIHI AEH pumps



Versatility for tough applications

For applications that don't require the very low NPSH functionality of the SIHI CEH pump, SIHI AEH pumps offer the widest available range of product and material options.

They are specifically designed for heavy-duty industrial applications requiring problem-free pumping of clean, vapor-entrained fluid at pressures to 40 bar (580 psi).

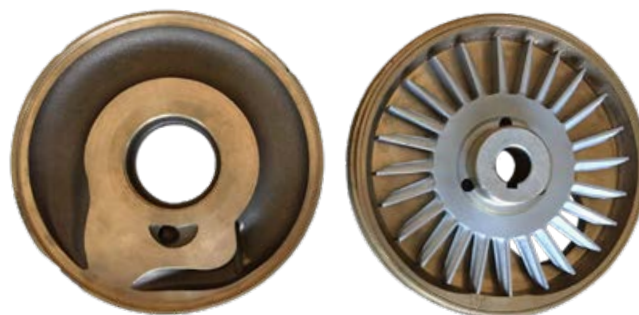
See page 7 for industry and application details.

Available sealless coupling configurations

SIHI AEH pumps are available in sealless configurations. By eliminating mechanical seals, these magnetically coupled units provide zero-emissions performance for improved safety and compliance with environmental regulations. They are ideal for applications containing liquids that are difficult to seal.

Construction

- **Materials:** Cast iron, ductile iron, stainless steel and bronze
- **Shaft sealing:** Gland packing, mechanical sealing (single or double) and magnetic drive



Side channel enclosure (left) and vane-wheel impeller (right)

SIHI CEH and AEH pumps

Industries

- Industrial gas
- Chemical
- Petrochemical
- Biofuel
- Pharmaceutical
- Food and beverage (auxiliary processing)
- Water treatment
- General industry

Typical fluids and applications

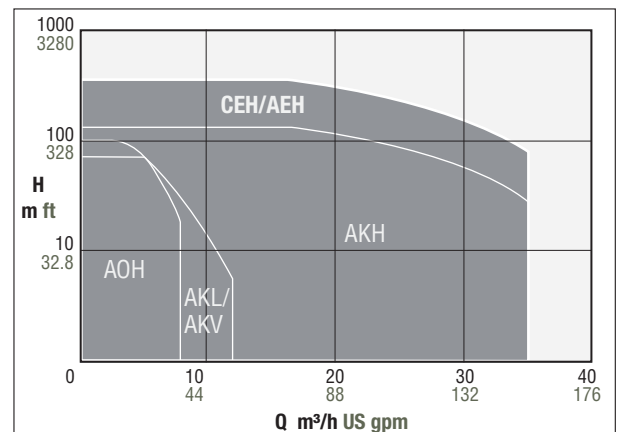
- Liquid petroleum gas (LPG)
 - Car filling
 - Bottle filling
 - Truck offloading
- CO₂ transfers
- Solvent transfer
- Acids and alkalis
- Liquids near the boiling point
- Condensates
- Distillates
- Refrigerants
- Liquefied gases
- Boiler feed water
- Transformer oil filtration
- Liquids under unfavorable suction conditions (NPSH less than 0.5 m/1.64 ft)

Performance data

- Capacity:** to 35 m³/h (154 US gpm)
- Delivery Head:** to 354 m (1161 ft)
- Speed:** to 1450 rpm (50 Hz);
to 1800 rpm (60 Hz)
- Temperature:** to 120°C (248°F);
to 180°C (356°F) for high-temperature design;
Higher temperatures on demand
- Casing Pressure:** PN 40 (580 psi)



Range chart



Options

- PAEK impeller
- PEEK® spacer
- High impeller/channel clearance
- Retaining stage
- Heating/cooling stage
- Fluid level sensor
- ANSI flange drilling
- PT100 connection

SIHI AKH pumps



Medium-duty industrial process pumps

SIHI AKH side channel pumps provide trouble-free pumping in a broad range of medium-duty applications for clean or turbid liquids.

Industries

- Chemical
- Food and beverage (auxiliary processing)
- Pharmaceutical
- Petrochemical
- Shipbuilding
- Water treatment
- General industry

Typical applications

- Dissolved air floatation
- Industrial gases
- Liquefied gases
- Water supply
- Clean-in-place (CIP)
- Engine cooling systems
- Shipyard:
 - Fuel transfer
 - Bilge and ballasts

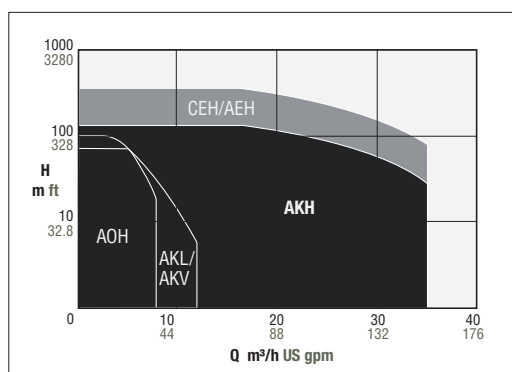
Construction

- **Materials:** Cast iron, bronze and stainless steel
- **Shaft sealing:** Gland packing and single mechanical sealing

Performance data

- Capacity:** to 35 m³/h (154 US gpm)
- Delivery head:** PN 25 bar models: to 242 m (794 ft)
PN 16 bar models: to 144 m (472 ft)
- Speed:** to 1450 rpm (50 Hz); to 1800 rpm (60 Hz)
- Temperature:** to 120°C (248°F)
- Casing pressure:** PN 16 (232 psi) or PN 25 (362 psi)

Range chart



SIHI AKL and AKV pumps



In-line, single-stage industrial pumps

The SIHI AKL (horizontal) and AKV (vertical) single-stage, in-line side channel pumps are lightweight, space-saving designs. They are cost-effective choices with low installation costs.

Industries

- Chemical
- Pharmaceutical
- Petrochemical
- Air conditioning and refrigeration
- Food and beverage
- Water treatment
- General industry

Typical applications

- Pressure boosting
- Industrial gases
- Liquefied gases
- Clean-in-place

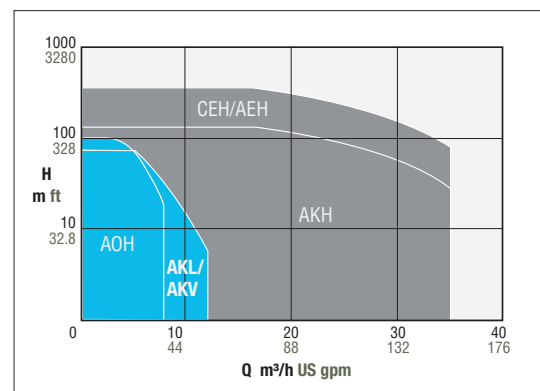
Construction

- **Materials:** Ductile iron and stainless steel
- **Shaft sealing:** Mechanical sealing

Performance data

- Capacity:** to 12 m³/h (53 US gpm)
- Delivery head:** to 70 m (229 ft)
- Speed:** 1800 rpm or 3000 rpm, depending on pump size
- Temperature:** to 120°C (248°F)
- Casing pressure:** PN 16 (232 psi)

Range chart



SIHI AOH pumps



Water industry workhorse

The SIHI AOH pump has a compact design for low-capacity applications in the water industry.

Industries

- Shipbuilding
- Agriculture
- Water
- General industry

Typical applications

- Shipyard
- Irrigation and drainage
- Water circulation and distribution
- Cooling water systems
- Fuel transfer
- Pressure boosting
- Wastewater disposal
- Mixing and cleaning systems

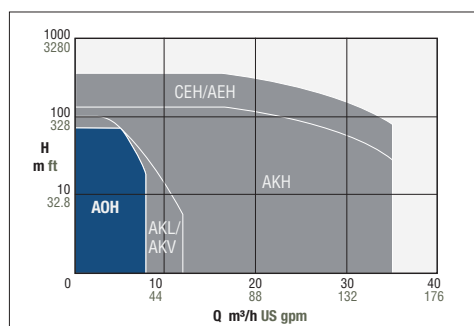
Construction

- **Materials:** Cast iron and bronze
- **Shaft sealing:** Gland packing and single mechanical sealing

Performance data

- Capacity:** to 7.5 m³/h (33 US gpm)
- Delivery head:** to 98 m (321 ft)
- Speed:** to 1450 rpm (50 Hz) and to 1800 rpm (60 Hz)
- Temperature:** to 120°C (248°F)
- Casing pressure:** PN 10 (145 psi)

Range chart



Which SIHI side channel pump is right for your application?

SIHI side channel pumps from Flowserve are designed to meet a wide range of performance and application needs. To choose the ideal side channel pump for your application, consider these key factors:

1. I need low-NPSH capability.

The SIHI CEH pump provides low-NPSHR functionality for systems with net positive suction heads of less than 0.5 m (1.64 ft).

2. We don't require low-NPSH capability, but we do need high-pressure performance or specialized options.

Consider SIHI AEH pumps, which offer the widest range of materials and customizable options for standard side channel applications.

3. We have robust fluid handling needs, but our system pressure doesn't have to generate high differential pressure.

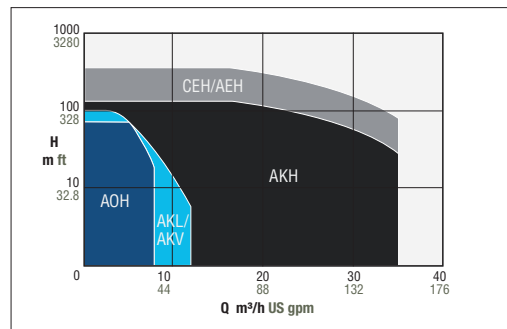
SIHI AKH pumps are suitable for medium-duty applications, and still offer some specialized options.

4. We have limited space, a limited budget and light-duty applications.

The low installation cost and space-saving designs of the SIHI AKL (horizontal) or AKV (vertical) pumps may offer you an efficient option.

5. We just have a basic pumping job and don't need a high-capacity system.

If you simply need to pump water or other basic liquids with no abrasive particles, consider the SIHI AOH pump.



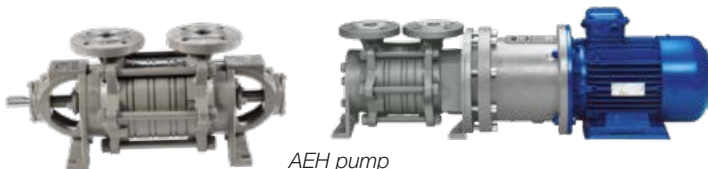
CEH pump



AKH pump



AOH pump



AEH pump



AKV pump



AKL pump

Need more help optimizing your side channel pumping solution? Contact your Flowserve representative today.



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