

VOITH

The Reference in
Silent Thrusters.
Voith Rim-Drive Technology





A Revolutionary Thruster System.

Building a Rim-Drive thruster system that offers the ultimate in comfort without compromise in performance is our driving motivation. The Voith Inline Thruster (VIT) and the Voith Inline Propulsor (VIP), a revolutionary thruster concept. The Voith Inline system is the perfect drive for a bow or stern thruster arrangement. It can be installed in a small skeg, as a transverse tunnel thruster, or as a swing-out/azimuthing system, or as well as a main propulsor.



VIT 2300-1500 (1 500 KW)

The VIT significantly improves the vessel comfort and provides increased thruster performance. For Dynamic Positioning (DP) or harbor maneuver – the VIT is the right choice.

The steerable Voith Inline Propulsor (VIP), combined with a nozzle, is designed as a main propulsor or assist system for DP or tracking modes, while providing the highest comfort-class criteria.

General specifications

The Voith Inline Thruster and the Voith Inline Propulsor systems are driven by an integrated permanent magnetic (PM) synchronous ring motor. The PM motor is cooled by the surrounding water so no additional cooling equipment is required.

The motor windings are housed in the stator, the permanent magnets are housed in the rotor. The rotor is supported by water-lubricated bearings for the radial and axial load. The propeller blades made from Carbon Fibre-Reinforced Plastic (CFRP) are directly connected to the inner ring of the rotor, which eliminates the need for a central shaft or gearbox. The sense of rotation, as well as the speed, is controlled by frequency converters.

Stator and rotor

The stator houses the windings of the electric motor and monitoring elements. The mounting brackets with vibration dampers, as well as power and monitoring cables, are connected to the housing. The rotor houses the high-performance magnets on the outside and accommodates the thruster blades made from CFRP on the inside.

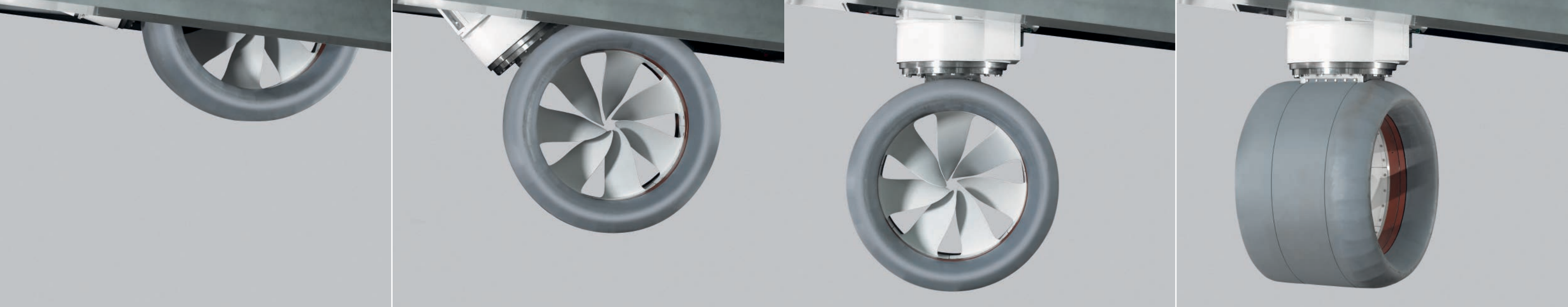
Thruster housings are air pressure-tested to verify water tightness and are filled with resin to encapsulate all electric parts and permanent magnets.

Bearing system

The VIT, as well as the VIP, operate with a hydrodynamic (water-lubricated) bearing system. The design does not need additional lubrication and has no dynamic seals. The system features a hard-soft surface matching system that uses a unique, yet well-proven, material combination.

Blades

The fixed pitch thruster blades are made from Carbon Fibre-Reinforced Plastic (CFRP). Each blade, employing a special coating system, is individually replaceable and highly resistant to cavitation.



Voith Inline Propulsor in swing out/azimuthing configuration

Power and monitoring cables

Voith uses high-performance underwater cables and connectors for the monitoring as well as for the power supply of the thruster systems.

Green efficiency

The VIT and VIP systems do not require any additional cooling. No oil or grease is used for lubrication. The PM synchronous motor is among the most efficient electric motors available, making it an excellent selection for high-performance thrusters. Elimination of the underwater gearbox/propeller hub and the struts further increase efficiency. With high thrust in both directions the slim design requires less installation space in the vessel. Reduced weight, in contrast to conventional systems, allows better performing ship lines, resulting in reduced fuel consumption. In total, an exceptional environmentally friendly system.

Performance

Exceptionally high dynamic performance. PM motors deliver high torques – even at low revolutions. High acceleration in combination with instant thrust values increase the dynamic behavior of the vessel. The VIT thrust is equal in both directions, while the VIP thruster is designed for optimum thrust in its preferred operating direction. VIT/VIP enhances the DP performance of the vessel significantly.

Underwater mounting

The system can be upgraded for underwater replacement avoiding the need for drydocking.

Reduced noise/Vibration emissions

The unique design of the VIT/VIP results in significantly reduced noise and vibration emissions. With conventional thrusters there are three key reasons for noise:

- 1) The propeller tip clearance, i.e. the distance between the inner tunnel hull and the tip of the blades
- 2) Shaft-induced cavitation due to the underwater gearbox and support structure
- 3) Vertical transmission of cavitation noise and vibrations into the vessel

All three elements are not present in the VIT/VIP design, therefore noise and vibration emissions are greatly reduced.

No propeller ventilation problems

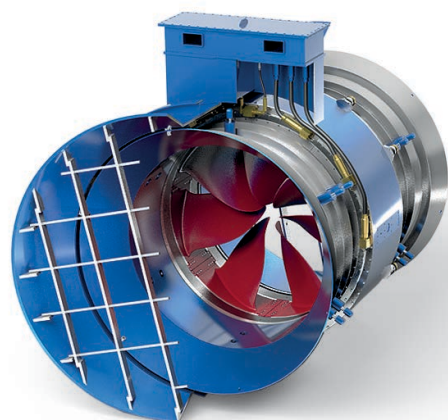
In rough seas, thrusters tend to ingest air even when fully immersed. Propeller ventilation creates significant stress in mechanical parts, including bevel gears of conventional thrusters. The VIT/VIP is not significantly stressed when the propeller ventilates.

Reduced weight/Slim design

The Voith Inline Thruster concept has significantly lower weight than conventional thruster systems and requires less installation space, allowing the designer to place the thruster further from the ship's pivoting point to offer superior ship performance and reduced fuel consumption.

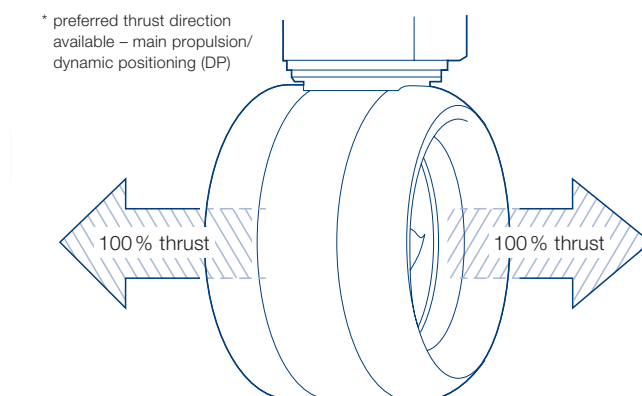
System responsibility

The Voith scope of supply includes the entire system: Including tunnel, grids, flow parts, and power- and control electronics. Voith is the system supplier – your single point of contact.



VIT tunnel thruster assembly

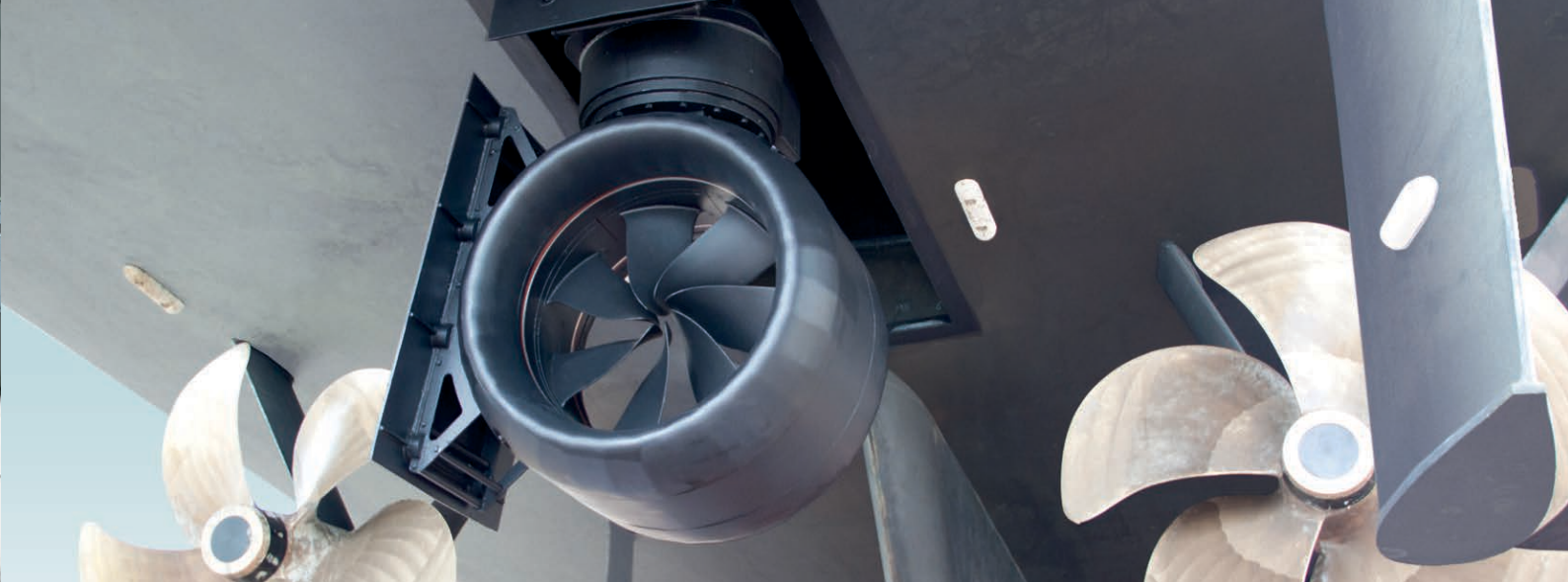
VIT/VIP*: 100 % thrust in all directions



Voith Inline Thruster VIT



Voith Inline Propulsor VIP



Swing-out azimuthing VIP (VIP SO-AZI)

Customized swing-out fully azimuthing units, meeting performance requirements, are available over the entire VIP product range. Systems include the hydraulic or electric power pack for the azimuthing control as well as for the swing in/out system. The system allows flush hull installation with extremely small installation dimensions in the ship.

Test facility – FAT

Voith tests all thrusters under realistic conditions by using an in-water test facility. During factory acceptance tests, thrusters are operated per classification rules in real conditions. The test program includes verification of thrust performance, thermal behavior, endurance, insulation, and high voltage test.

Low maintenance – worldwide service

The VIT/VIP is designed as a low-maintenance system. However, in the unlikely event of any kind of damage, a worldwide network of spare parts and service technicians are available through the Voith Group.

Voith Inline Thruster/Voith Inline Propulsor package

The VIT/VIP are offered as a complete system ready to be installed into any vessel.

The scope of supply consists of

- Thrust control panel, including monitoring
- Switch box incl. electric filters and chokes
- Frequency converter (water or air cooled)
- Interface to ships alarm system
- Interface to ships Autopilot/ DP System
- Tunnel with flow parts and grids, including solutions for small skeg installations
- Steering control system

Additional scope of supply for VIP systems

- Azimuthing /steering control system

Additional scope of supply for VIP SO-AZI systems

- Hydraulic or electric power pack for the full azimuthing system as well for the swing-in/out mechanism

Major advantages at a glance

- + Environmentally friendly design with water-lubricated bearing system
- + Significant noise and vibration reduction
- + Significantly reduced space requirements
- + Reduced weight
- + No cooling system required
- + No dynamic sealing needed
- + Exceptionally high dynamic performance of the thruster
- + Optimized thrust to input power relation
- + Outstanding DP performance
- + Equal VIT thrust in both directions
- + Customized thrust characteristics for forward and astern operation for VIP available
- + Unique propeller blade design for significantly reduced cavitation risk
- + Easy and fast installation
- + Low-maintenance system
- + Easily replaceable composite (CFRP) blades, even underwater
- + Customized swing-out/ fully azimuthing or top-mounting solutions available
- + Optional underwater mounting system available

Product range Voith Inline Thruster

Type	Power [kW]	Propeller diameter (A) [mm]	Outer diameter (B) [mm]	Width (C) [mm]	Weight* [kg]
VIT 380-50	50	380	560	280	165
VIT 550-110	110	550	790	355	400
VIT 850-200	200	850	1 120	420	910
VIT 1000-300	300	1 000	1 380	530	1 970
VIT 1350-500	500	1 350	1 750	650	3 200
VIT 1650-750	750	1 650	2 100	850	6 500
VIT 2000-1000	1 000	2 000	2 520	1 000	9 500
VIT 2300-1500	1 500	2 300	2 850	1 050	11 500

* Thruster only

Product range Voith Inline Propulsor

Type	Power [kW]	Propeller diameter (A) [mm]	Outer diameter (B) [mm]	Width (C) incl. nozzle* [mm]	Weight** [kg]
VIP 380-50	50	380	600	430	250
VIP 550-110	110	550	840	555	530
VIP 850-200	200	850	1 170	760	1 100
VIP 1000-300	300	1 000	1 440	940	2 200
VIP 1350-500	500	1 350	1 810	1 200	3 500
VIP 1650-750	750	1 650	2 160	1 500	6 900
VIP 2000-1000	1 000	2 000	2 580	1 800	9 960
VIP 2300-1500	1 500	2 300	2 880	2 000	12 050

* Nozzle according to customer requirements

** Thruster only

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