

Wärtsilä Steerable Thrusters

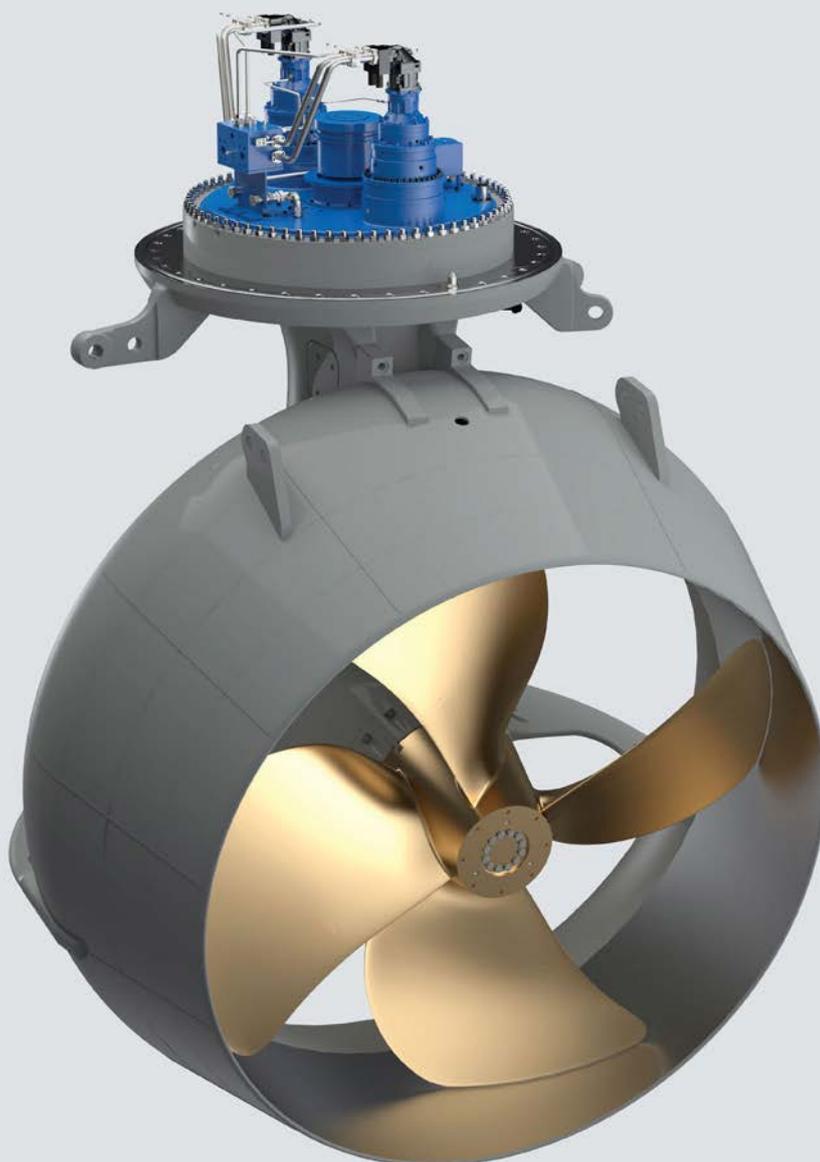
Underwater Mountable (UWM) Series



Like all thrusters in the Wärtsilä Steerable Thruster (WST) series, the Underwater Mountable thrusters have been developed utilising the company's extensive know-how and experience in thruster design.

The development work has focused particularly on the specific needs of offshore applications in order to provide superior dynamic positioning (DP) and main propulsion performance. The latest computational fluid dynamic (CFD) techniques have been utilised to optimise the design.

The Wärtsilä Underwater Mountable (UWM) Thruster series is designed for use with semi-submersible drilling rigs, drillships and other vessels, such as semi-submersible accommodation rigs, crane vessels and pipe layers, that require thrusters that can be mounted while the vessel is afloat. The UWM series has a high power output of up to 6500 kW, which makes it favourable for use on large offshore construction vessels (OCVs).





Key Benefits

First class reliability: Reliability plays an important role in the UWM thruster series.

To achieve a high level of reliability, a series of design features have been incorporated:

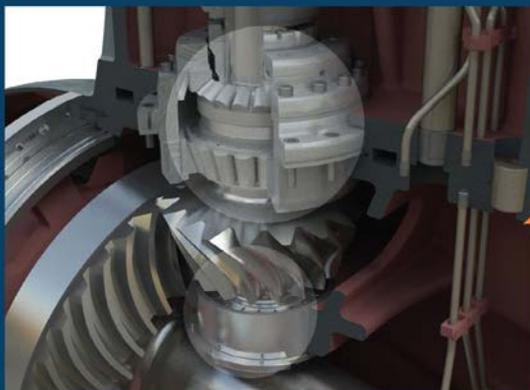
- The gearset, which is the centre of the driveline, is designed for smooth running and the optimal transfer of propulsive power.
- The gears and shafts are supported by thoroughly engineered bearing solutions and are enclosed within a sturdy thruster housing designed for stiffness.

- Extensive measures have been taken to avoid or significantly reduce the effect of load fluctuations. For example, the optimized nozzle and the design of its connections reduce power and thrust fluctuations originating from the rotating propeller.
- Optimal lubrication conditions for the gears and bearings are maintained by the high capacity lubrication system and a redundant propeller shaft seal.
- Optional continuous monitoring of the oil and seals.

With the Wärtsilä PCMS (Propulsion Condition Monitoring Service), the reliability and availability of the thruster can be improved even further. As this service is recognized by the main marine class societies, the thruster overhaul intervals can be extended according to the condition of the equipment. The PCMS is based on a vibration, oil and operational analysis carried out by technical experts from Wärtsilä Services.

High efficiency: The UWM thruster series features the Wärtsilä thruster nozzle to provide excellent bollard pull performance. The propeller, nozzle,

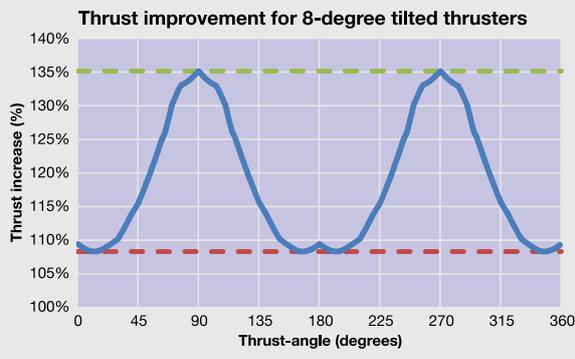
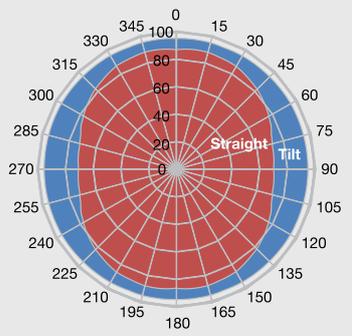
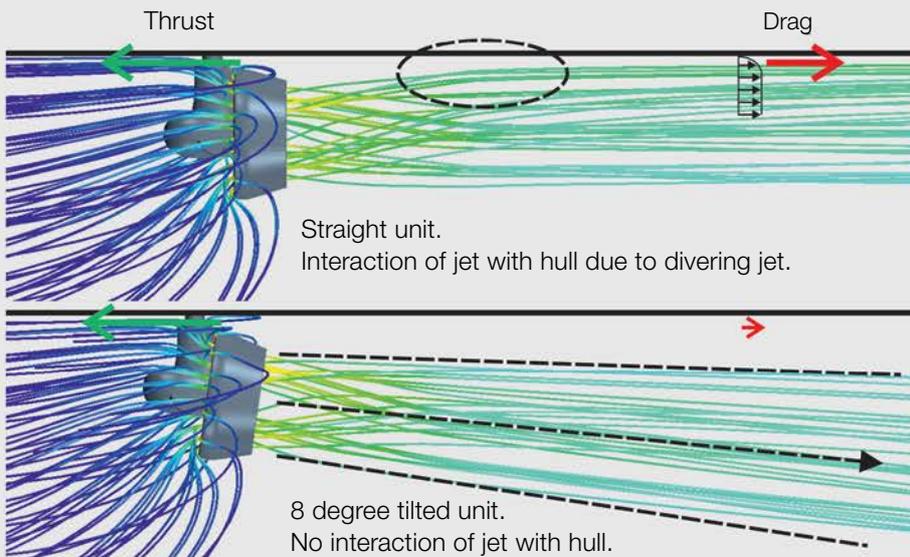
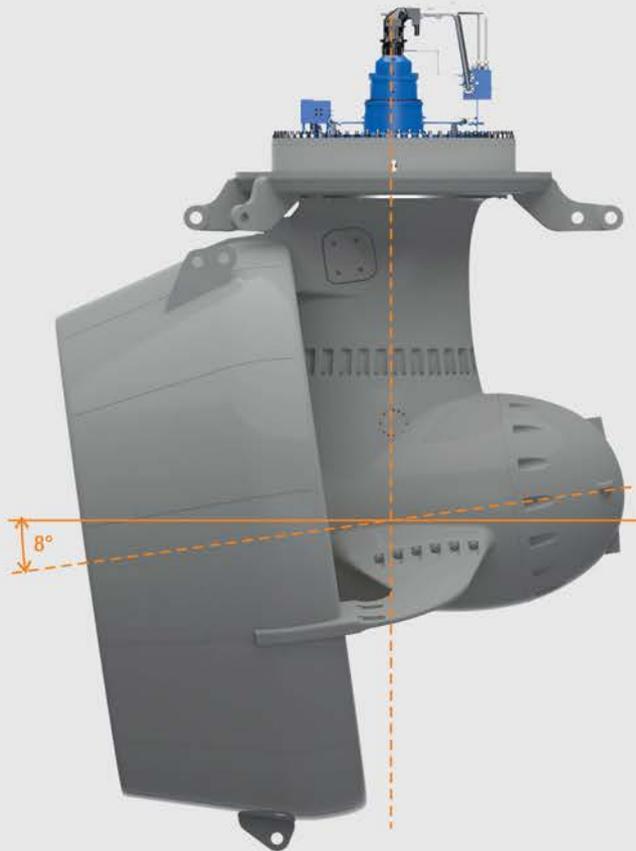
Pinion Bearing Arrangement



The spiral bevel gear-set, which is the heart of the thruster, has been thoroughly reviewed. Not only has the 8° gear angle been included in the gear geometry, the gear application and safety factors have been increased and a high quality gear material has been selected.

The pinion is supported on both sides with a new bearing layout that has an increased capacity to accommodate load fluctuations. This has been achieved by applying new roller bearing types in a pre-tensioned bearing configuration.



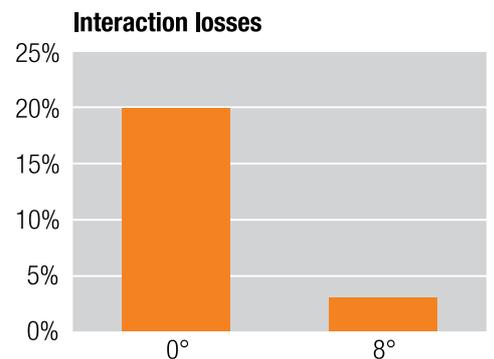


gearbox housing and the nozzle connection, are designed to achieve high hydrodynamic efficiency. In transit free-sailing condition, the Wärtsilä thruster nozzle develops a greater thrust due to its improved power absorption. As a consequence, the need for overspeed is reduced.

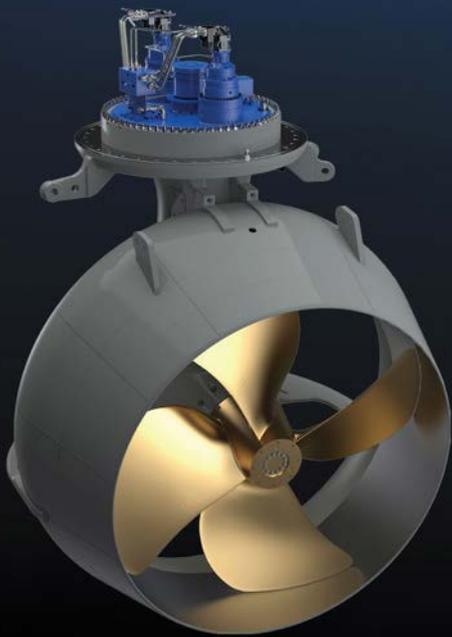
With three propeller diameter choices and different power levels, the UWM thruster series can offer a tailor-made solution to meet customer requirements regarding, for example, bollard pull or vessel propeller size limitations.

Effective DP operations: The three thrusters within the Wärtsilä UWM series all feature an 8 degree tilted propeller shaft, which has been achieved by applying a gear that includes the tilt instead of a bevel gear set. Extensive CFD calculations prove that the 8 degree tilting of the propeller shaft and the nozzle has several advantages, the chief of which is that the propeller jet is directed away from the hull and other thrusters in the vicinity. In addition to reducing hull interaction losses, this also greatly reduces interaction between the thrusters, thus making the so-called 'forbidden zones' considerably smaller. The overall gain in available bollard pull thrust for dynamic positioning operations is about 15% when compared to conventional units.

Due to the optimal alignment of the propeller shaft and the nozzle in the tilted configuration, a higher propulsion efficiency and more overall thrust is provided when compared to solutions with non-tilted nozzles. The combination of more effective DP operations and high overall efficiency results in reduced fuel consumption and lower operating costs.



Comparison of thrust availability for a semi-submersible rig equipped with 8 thrusters. The red area shows the thrust availability in case of non-tilted thrusters, the blue area shows the available thrust in case of Wärtsilä Steerable Thrusters with an 8 degree downward tilt. Depending on the angle in which the thrust is directed, up to 35% more thrust is available for the rig equipped with the 8 degree tilted thrusters.



Technical Specifications

The UWM thruster series includes the Wärtsilä WST-45U and WST-55U steerable thrusters, as well as the largest model, the Wärtsilä WST-65U. The maximum power levels are 4500, 5500, and 6500 kW respectively.

By providing two propeller diameter options for the most common power levels of 4500 and 5500 kW, the UWM series provides options for high bollard pull and specific propeller diameter requirements.

Main technical data

Type	Input speed rpm	Power * kW	Propeller diameter mm	Tilt
WST-45U	720 600	4000 4500	3600	8°
WST-55U	720 600	4500 5500	3900	8°
WST-65U	720 600	5500 6500	4200	8°

* The maximum power level depends on input speed and is given for dynamic positioning (DP) application.

Dimensions and weights

Type	A mm	B mm	C mm	M mm	L mm	H mm	Outboard part ¹		Well ² kg
							dry kg	in water kg	
WST-45U	3600	3300	2518	2324	2570	1242	51000	34500	9500
WST-55U	3900	3625	2648	2516	2763	1390	63500	31800	11900
WST-65U	4200	3820	3006	2719	3025	1390	77500	49500	13200

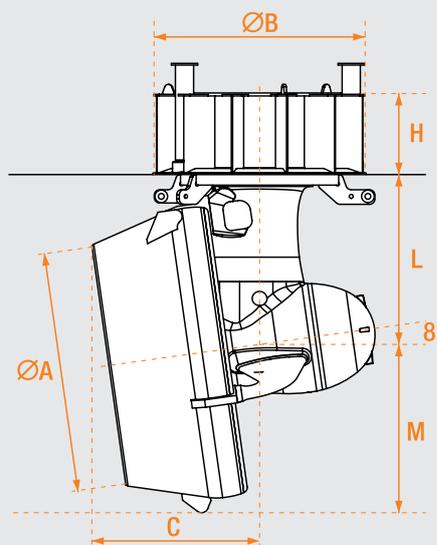
1) With oil

2) Including top cover, bottom cover, pipe covers, valves and position sensor

Compact and with less weight:

Detailed FEM analyses have been made to optimize the strength of the components so as to keep the overall weight as low as possible. Additionally, the efficient closed-loop electro-hydraulic steering has compact dimensions and less weight since only a small reservoir is needed for the hydraulic oil. The compact dimensions result in less space requirements in the thruster room and more payload capacity for the vessel.

Easy installation: All necessary interfaces are contained within the thruster well, which can be installed by welding without additional machining. The lubrication and steering hydraulics are delivered in frames with standard interfacing. Field-bus connections are used to connect the thruster and its auxiliary systems to the Wärtsilä Propulsion Control System. The underwater mounting system, the hydraulics, and the controls are all designed to minimize the installation time and efforts of the yard.



Wärtsilä UWM thrusters power range

