



Innovative Power Transmission



RENK AED – Advanced Electric Drive
The ultimate propulsion for quiet ships

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Typical application of RENK's AED

... as a slow-speed option on corvettes and frigates



... as the main propulsion system on megayachts



Applications for RENK AED

- Corvettes, frigates: silent running and low speed
- Megayachts: low-noise main propulsion
- Submarines: low-noise main propulsion
- Research vessels: low-noise main propulsion
- Fishery protection vessels: low-noise main propulsion
- Special vessels such as cable- or pipe-laying ships: main propulsion

In all these applications, RENK's AED integrates perfectly with the onboard electrical system and replaces the commonly used direct-electric-drive motor.

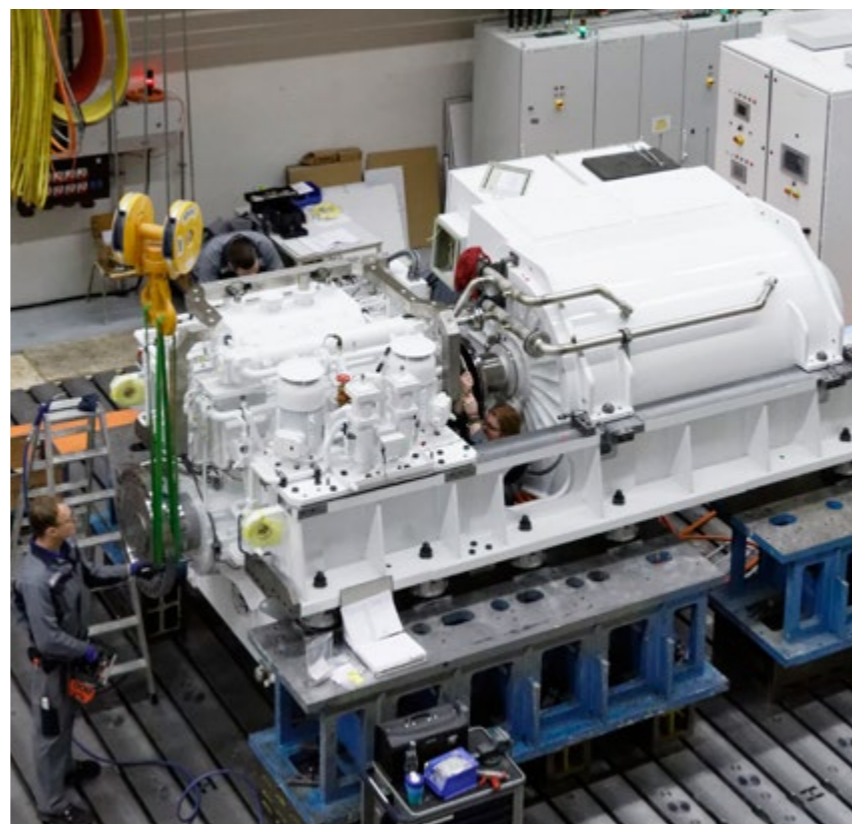
... and many other

The experience RENK has accumulated since 1960 in designing and manufacturing marine gear units provides the basis for the engineering of gas-turbine and diesel-engine driven propulsion systems for navies throughout the world. Over 600 propulsion units with RENK gears are in service today, including gas-turbine installations on various NATO frigates and diesel-engine propulsion packages for corvettes and patrol vessels of 40 nations worldwide. Included are highly sophisticated CODAG systems for the German and Turkish navies and the US Coast Guard as well as the hybrid CODELAG propulsion system for the Italian FREMM and the German F125 frigates. A complete propulsion module is now available in the form of the RENK AED (Advanced Electric Drive) which is the subject of this brochure.

Electric motors represent a technically proven and increasingly popular option for marine and hence naval, megayacht or research vessel propulsion systems.

With improved frequency stability and efficiency, this is facilitated by the power electronics used nowadays and installed between the onboard generators and the onboard power system. An alternative to electrical direct-drive systems with their large, bulky and heavy motors running at propeller speed, are high-speed motors with reduction gear units.

A perfect realization of this concept is RENK's AED where the electric motor and the gearing are installed on a common raft elastically mounted. The special advantages: compact footprint, easy installation, low weight, and incomparably quiet operation.



AED on the test bed

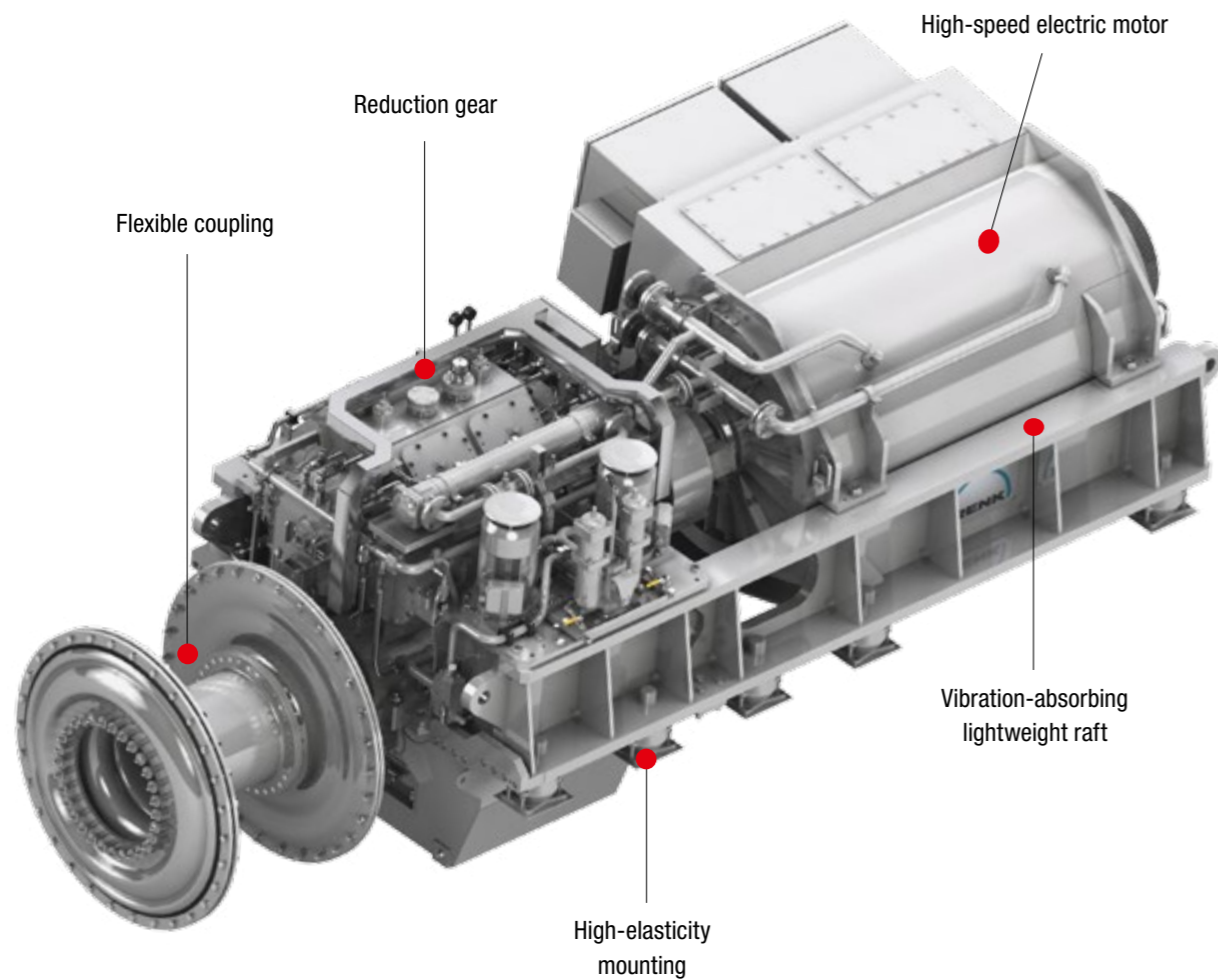
Features

- Preassembled, very straightforward modular installation
- Compact and ultra lightweight, 40 percent less than a direct-drive motor
- Very low installation height
- High-elasticity propeller coupling prevents noise radiation
- Low-noise operation thanks to water-jacket cooled electric motor, low-noise gear unit, specially developed soft-elastic mounting
- Suitable for both fixed- and controllable-pitch propellers
- The lowest noise level to naval standards, so no special adjustments needed
- Output speed adapts flexibly to propeller requirements
- Standard components, therefore almost no maintenance input

RENK AED for ratings of up to 6 MW

The all-in propulsion module

RENK's AED is available in four ratings, from 1.4 to 6 MW. Intermediate requirements can be served by adjusting the power electronics of the next-larger motor. This allows a continuous range of outputs up to 6 MW.

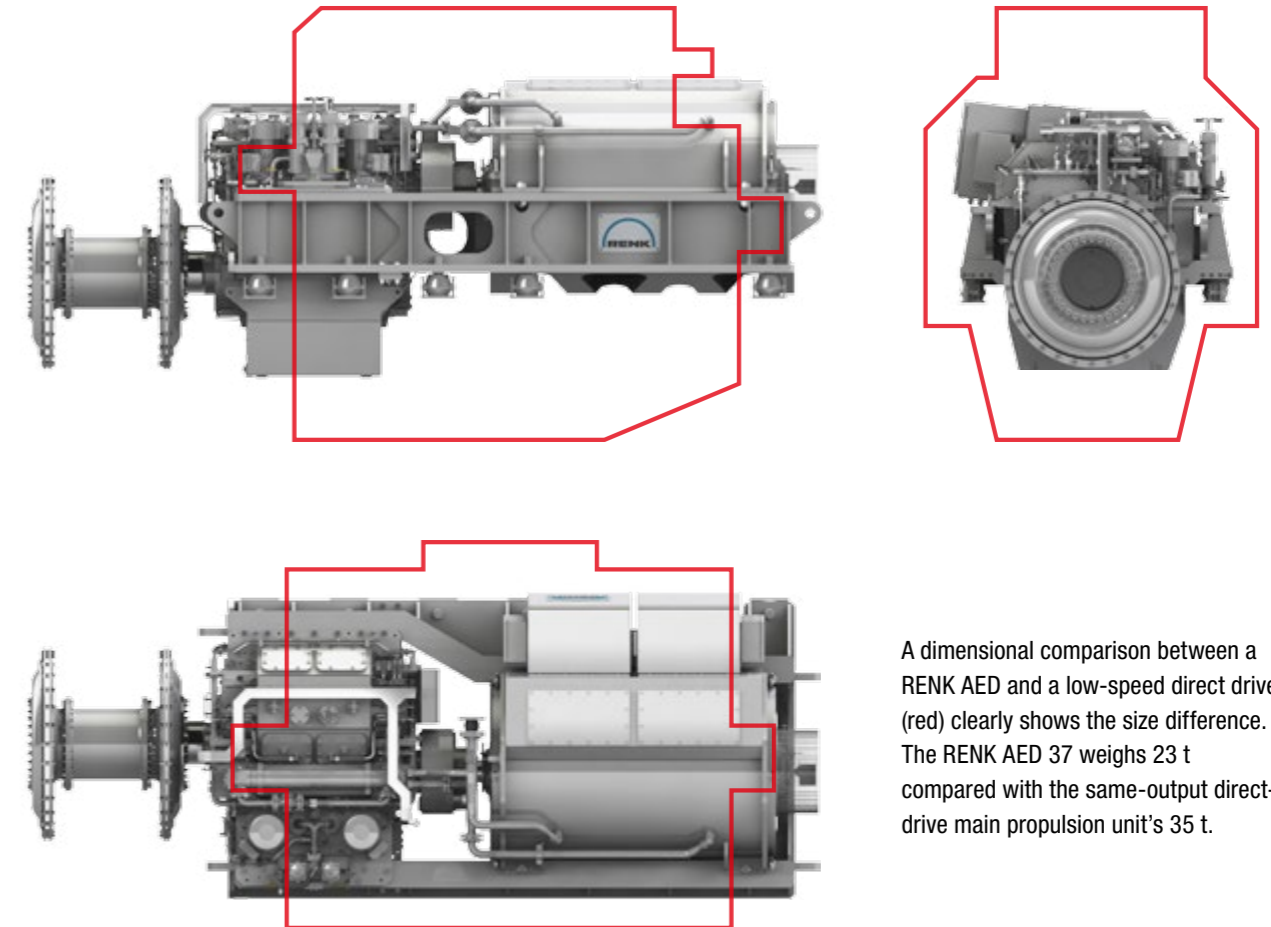


	AED 14	AED 23	AED 37	AED 60
Max. power (kilowatt)	1400	2300	3700	6000
Input RPM, electric motor	1800	1800	1800	1900
Propeller RPM, selectable range	250-450	250-400	190-350	190-300
Electric-motor voltage	690	690	690 (4000)	4000
Weight in tonnes (t) ¹⁾	13	18	23	34

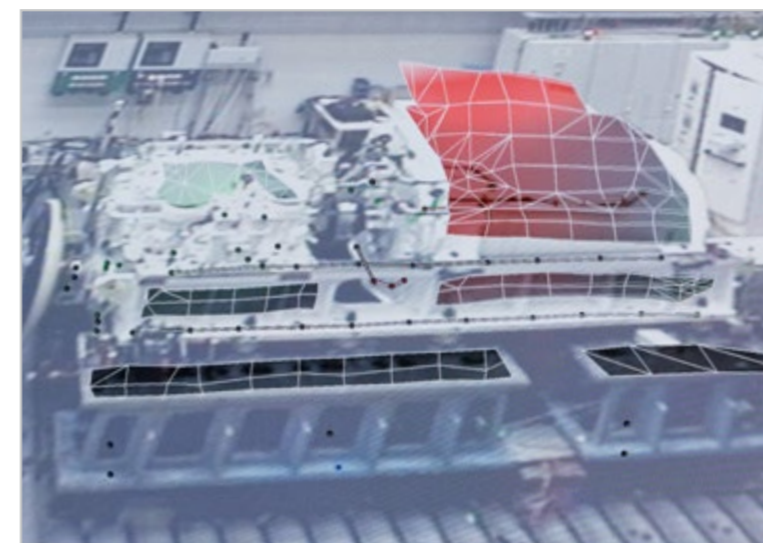
1) weight includes noise insulation and high-elasticity output coupling

RENK AED 37

Less weight, less space



A dimensional comparison between a RENK AED and a low-speed direct drive (red) clearly shows the size difference. The RENK AED 37 weighs 23 t compared with the same-output direct-drive main propulsion unit's 35 t.



Dynamic deformation measured by laser vibrometer

RENK AED

Installation options

Direct drive for megayachts and research vessels – quiet and powerful

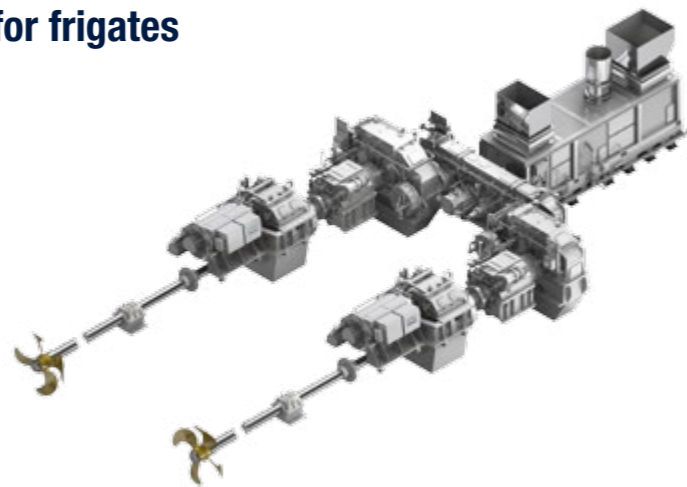
Ideal combined with fixed-pitch propeller, yet controllable-pitch propeller possible, too.



Supplementary propulsion system for frigates and corvettes – compact and quiet

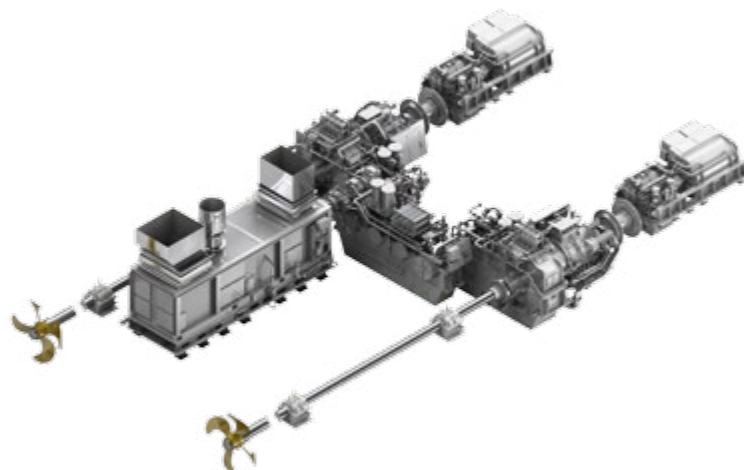
In the propeller shaft of a CODELAG system

- Combined operation of gas turbine and RENK AED
- solely gas turbine operation
- solely RENK AED operation



In front of a CODELAG gear system

Supplementary drive for corvettes and frigates running at silent and low-speed. Noise at submarine level.



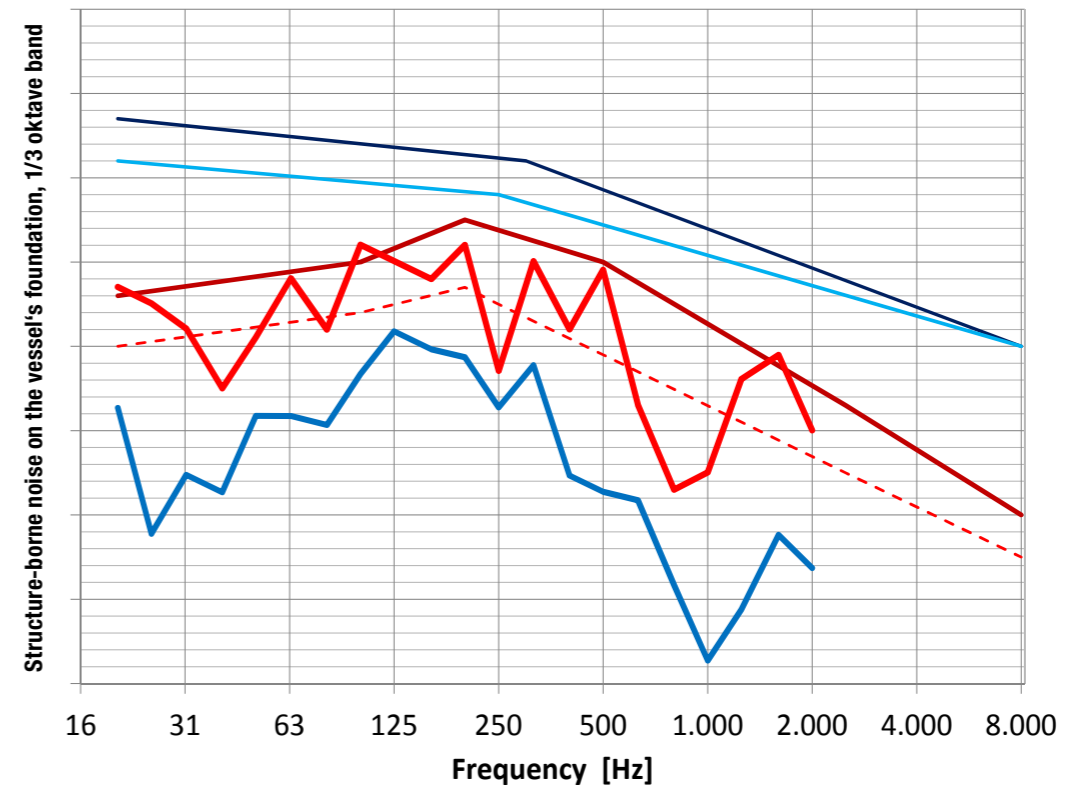
RENK AED

As quiet as a submarine

RENK's AED is engineered for very low-noise operation. It has a rigid lightweight raft with a high natural frequency and soft-elastic mounting. In combination with the low noise level of the electric motor and the double-helical reduction gear unit, the structure-borne noise is well below ICES 209 and what is required of frigates at low speed. In fact, it is even on a par with submarines.



Structure-borne noise levels measurement below soft elastic mount



Calculated foundation levels based on prototyp source levels. Levels round 500 Hz are caused by resonance of elastic mount.

- Limit curve research ship ICES209
- Limit curve for low-noise naval vessels at 12 kn
- Noise level submarine 4 kn
- Expected for RENK AED at full load
- - - Expected for RENK AED at half speed
- Predicted noise at foundation at full load
- Predicted noise at foundation at low load



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