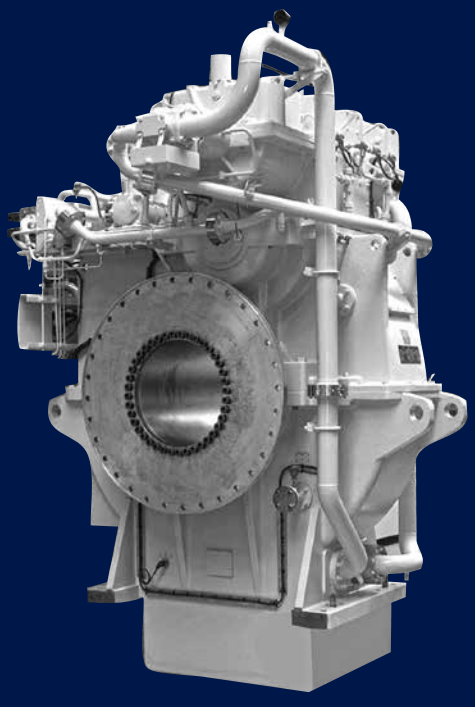
RENK

Innovative Power Transmission

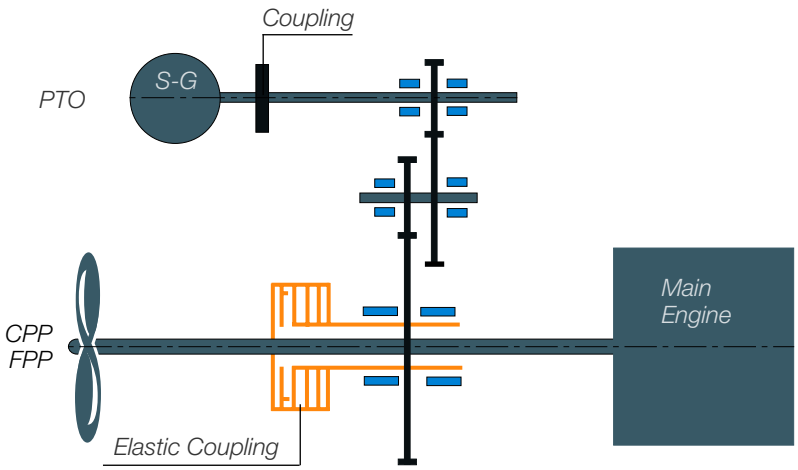


Tunnel Gearboxes Power-Take-Off

Power-Take-Home Systems for Slow Speed Engines

Type: SHHI

Power-Take-Off (PTO)



General Drive System

- Please note that the intermediate shafts can be provided – beside plain bearings – as well in roller bearings

Applications & Advantages

- Generation of electric energy by slow speed main engine
- Fuel cost reduction by utilization of good main engine efficiency
- Shut down of diesel-generator during sea voyage
- Reduction of maintenance and spare part costs
- Application of standard, high-speed generator
- Utilization of space behind main engine flywheel for tunnel gearbox installation
- Freestanding, independent gearbox system with integrated oil system
- Protection of generator and gearbox from torsional vibration through elastic coupling
- Can be provided in horizontally offset, 45° offset from the horizontal line or vertically offset

Figure: Tunnel gearbox with an angle of 45° from horizontal line

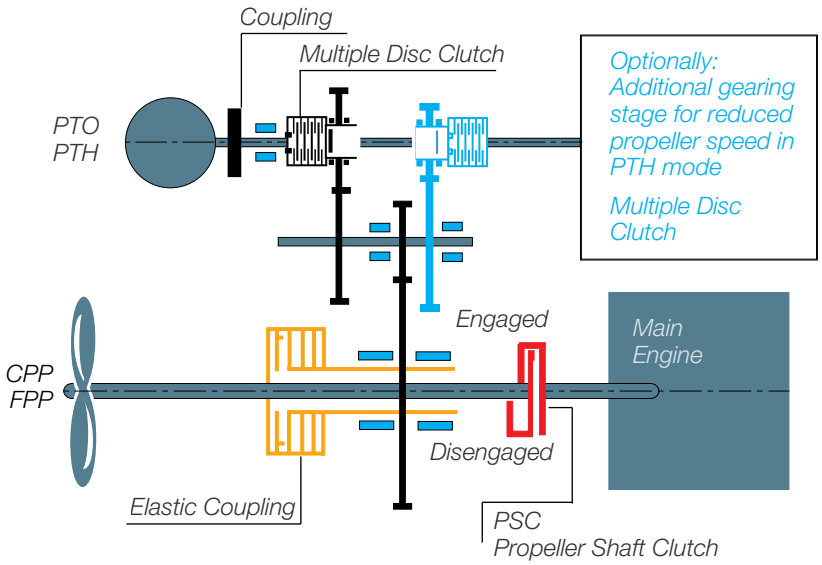
„Odfjell Tankers“

Type: SHHL II

Power-Take-Home (PTH)

Drive System for PTH

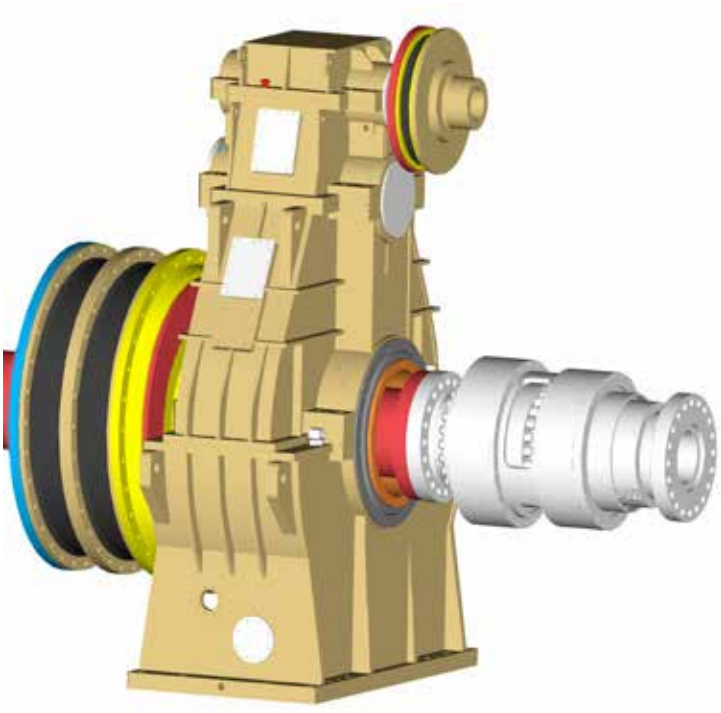
- Please note that this drive system indicated the PTH mode without reduced propeller speed in black color and the PTH mode with reduced propeller speed in blue color.
- In case of PTH mode request the main engine needs to be disengaged from the tunnel gearbox via a clutch – for example the Propeller Shaft Clutch (PSC).

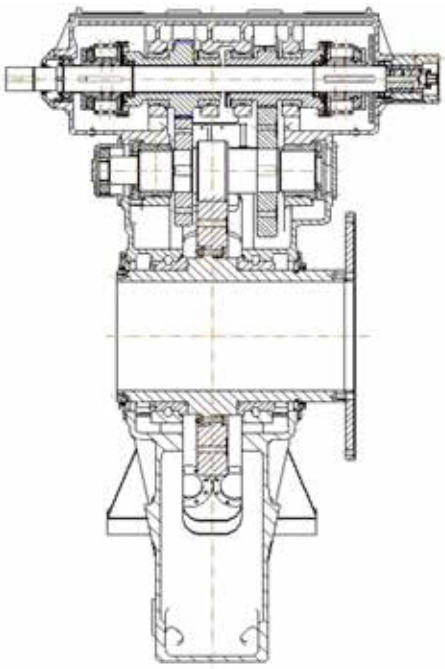


This shows a typical engine room with a tunnel gearbox and PSC application for PTH mode

Applications & Advantages

- Combined dual-use and independent system for single screw vessel
- Generation of electricity with slow speed main engine
- Power-Take-Home (PTH) system with disconnected main engine (optional)
- Power boosting capability / Power-Take-In (PTI) (optional)
- Improvement of ship's safety redundant electric propulsion system
- Reduction of operating costs; no demand for stand-by tug during main engine maintenance in port
- Flexibility of operation; additional slow steaming mode by electrical propulsion
- Efficiency improvement capability (optional); reduction of propeller speed to approx. 60% of nominal speed at Power-Take-Home mode (PTH with reduced propeller speed)



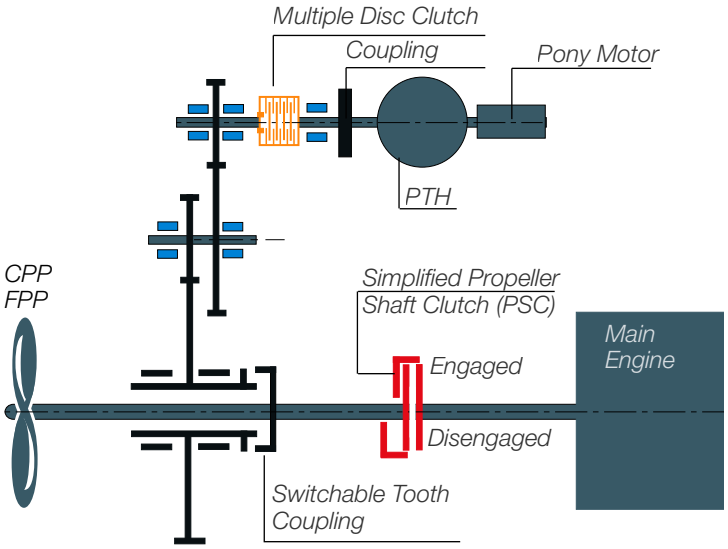


Type: SHHL II

Power-Take-Home (PTH)
Economical simplified emergency drive

Normal operation

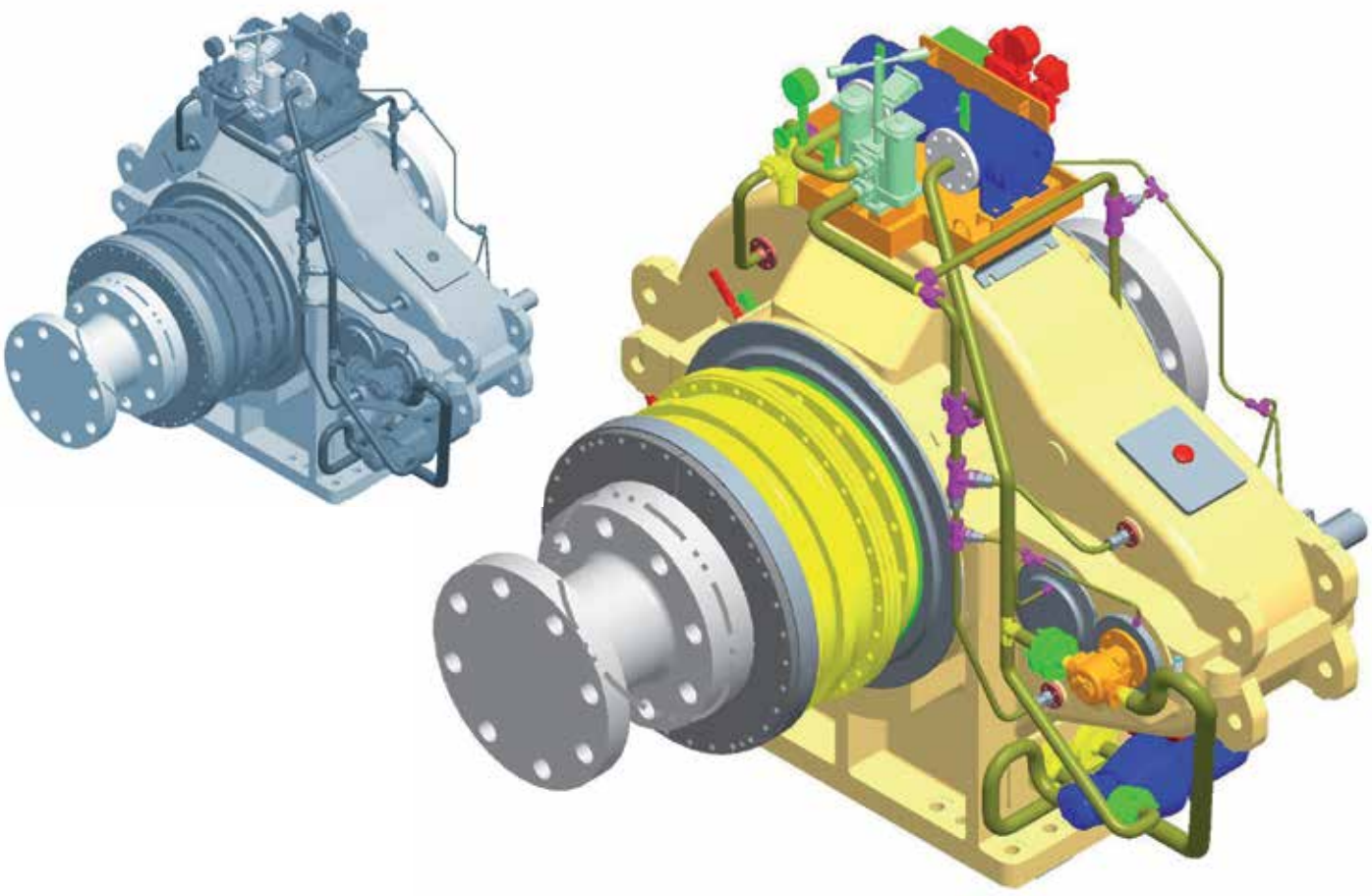
- Main engine connected to propeller via engaged PSC
- Tunnel gearbox out of operation disconnected by disengaged tooth coupling
- No power, no movement and no wear in emergency train



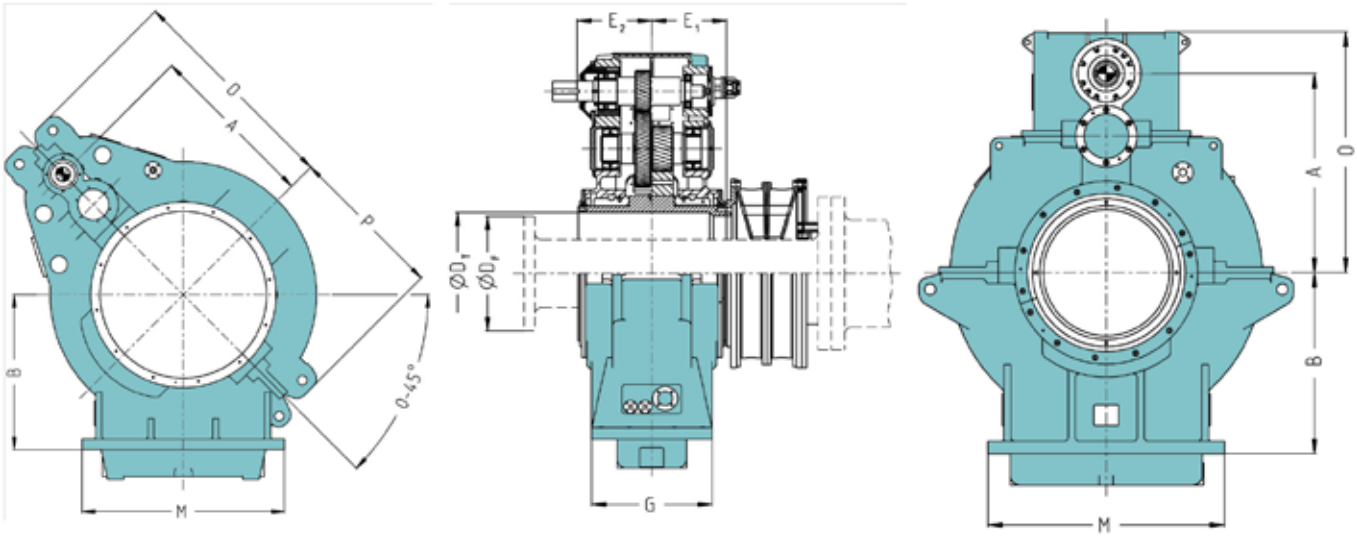
This shows the general drive system of the above mentioned simplified emergency drive

Emergency operation

- Main engine disconnected from propeller via disengaged PSC
- Tunnel gearbox in operation connected by engaged tooth coupling
- E-Motor propulsion mode via multiple disc clutch and tunnel gearbox



Dimension Table



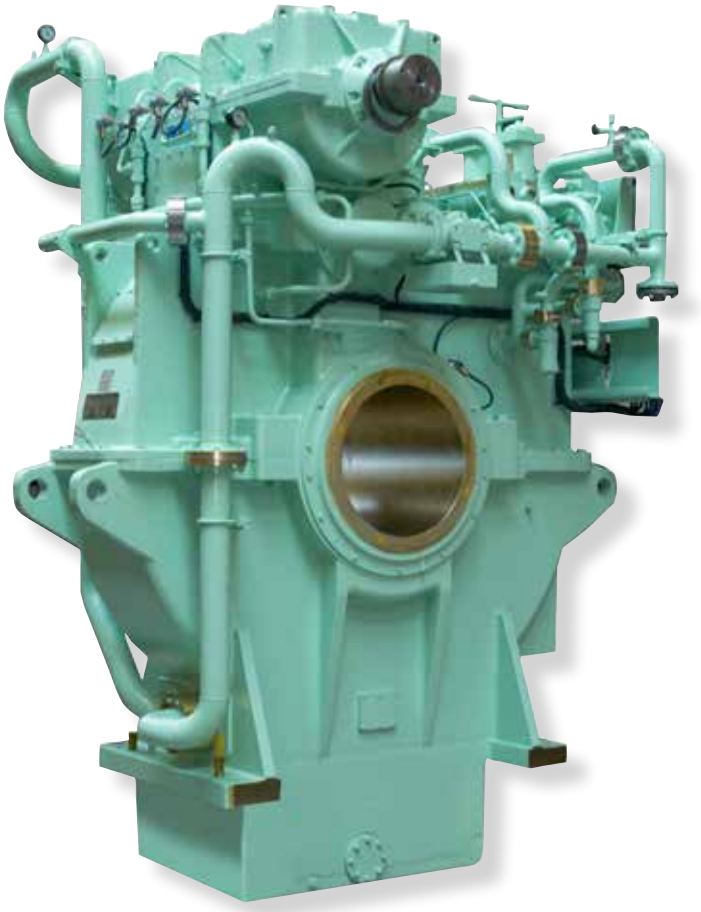
Size	Housing (mm)						Output	Input
	A	**B**	**G**	**M**	**O**	**P**	**E_2**	**E_1**
1135	1135	1040	710	1360	1600	960	450	490
1280	1280	1040	710	1360	1600	960	450	490
1430	1430	1300	900	1700	2000	1200	560	550
1600	1600	1300	900	1700	2000	1200	560	550

• As the tunnel gearbox is custom made the housing dimensions and centre distances (sizes) can be adjusted.

Size	**Shaft tunnel diameter D_T (mm)**			
	610	760	900	1090
	Maximum flange D_F (mm)			
	600	750	890	1080
	Weight (to)			
1135	6.3	6.9		
1280	6.6	7.2	7.6	
1430	9.8	10.4	10.8	11.7
1600	10.4	11.0	11.4	12.4

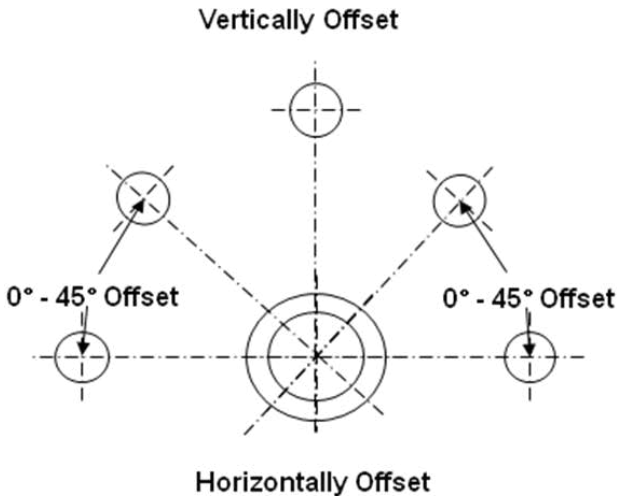
• The tunnel diameter D_T (mm) can be adjusted. So in case the propeller flange exceeds a diameter of 1090 mm please contact RENK accordingly.

• The weights are only for information and subject to modifications.



General picture of tunnel step up gearbox with vertical offset

In general RENK can provide the above-noted offsets:



General application of tunnel-step-up-gearbox

SHHL II-1430/610

- SHH means: Tunnel-step-up-gearbox (short: tunnel gearbox)
- L: Is indicating a multiple disc clutch placed in tunnel
- II: Is indicating a two stage tunnel
- 1430: Is indicating the centre distance from middle of tunnel until output shaft, here the centre distance is 1430 mm
- 610: Is indicating the tunnel diameter through which the propeller flange will be passed, here the tunnel diameter is 610 mm

Further details to the tunnel gearbox application:

Ship name:	Isabella Kosan
Ship type:	8,000 m³ LPG/Ethylene Carrier
Ship owner:	Lauritzen Kosan AS
Shipbuilder:	SEKWANG Heavy Industries Co, Korea
Tunnel gearbox:	1 x SHHLII - 1430/610
Rating PTO/PTH:	1,200 kW
Speeds PTO:	173 / 1,208 rpm
Speeds PTH:	1,200 / 102,1 rpm
Gear ratio PTO:	6,98 : 1
Gear ratio PTH:	11,75 : 1

RENK Aktiengesellschaft

Rheine Plant
Rodder Damm 170
48432 Rheine
Germany
Phone: +49 5971 790-0
Fax: +49 5971 790-208
Email: info.rheine@renk.biz

www.renk.eu

A company of the MAN Group

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