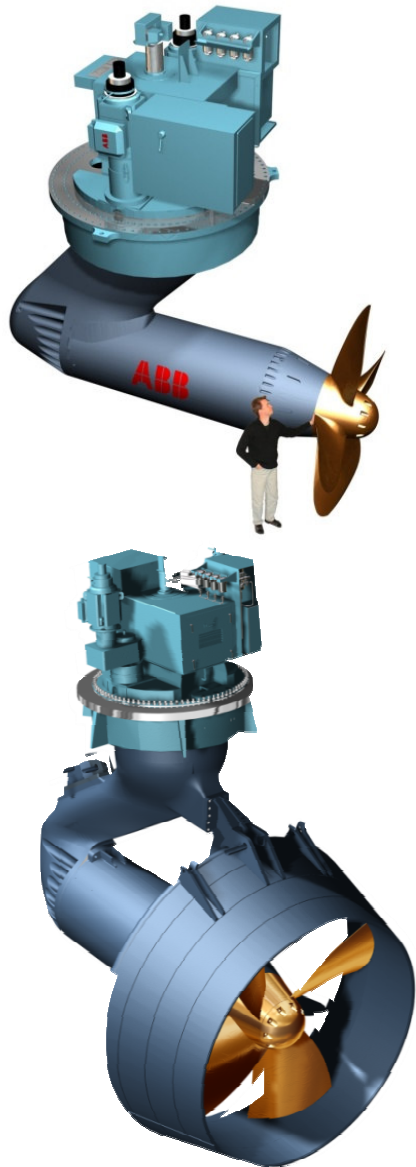




June 2012

# Azipod<sup>®</sup> C Propulsion and Thruster Units for 1300 – 4500 kW

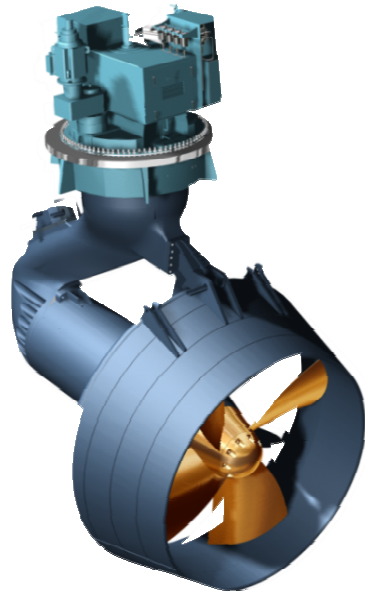
# Azipod® C for Low Power Applications in Azipod® Product Family



- Azipod CO is intended for open water ship applications between 1300 ...4500 kW, such as
  - Offshore Supply Vessels
  - Mega Yachts
  - Ferries
  - Wind Turbine Installation Vessels
  - Tankers
  - Research Vessels etc
- Azipod CZ is a thruster unit (3300 & 4500 kW designs, up to 60...84\* tons thrust) with a nozzle intended for high thrust applications such as
  - Drilling rigs and ships
  - Pipe layers and other DP vessels

\* In typical drilling vessel application

# Azipod<sup>®</sup> C - Technical Concept

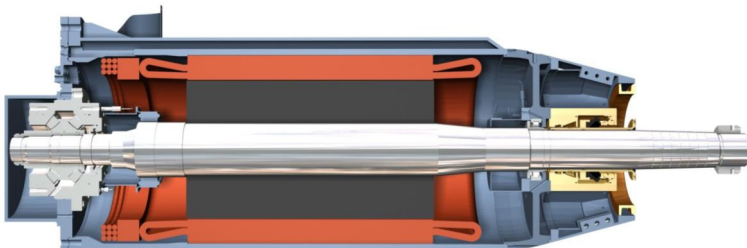


- A fully 360 degrees steerable propulsion unit
- No rudders needed
- Supplied by 690 V frequency converter
- Fixed-pitch propeller, directly mounted on the motor shaft
- Simple and environmental friendly construction

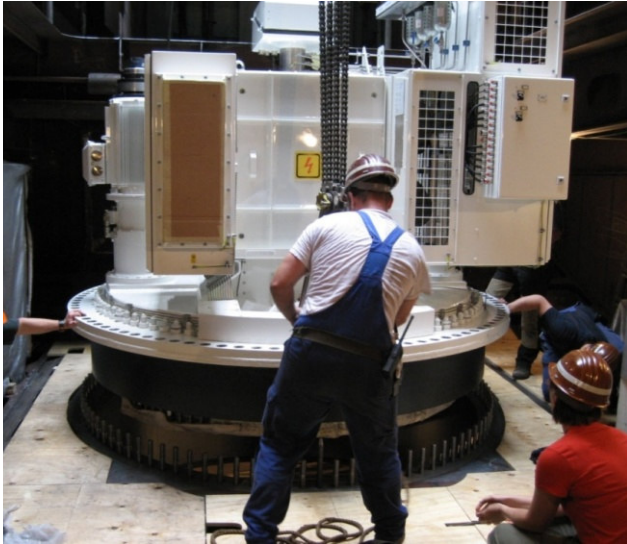
# Azipod<sup>®</sup> C - Technical Concept



- Electric power transmission
  - No gear losses
  - No gear lubrication oil
  - Less maintenance
- Permanent magnet synchronous motor
  - Very high efficiency over a wide power range
- Thruster unit directly cooled to surrounding sea water
  - No separate cooling system



# Azipod® C - Technical Concept



- Fully electric steering gear
- Simple installation at the yard
- Safe, silent and environmentally friendly



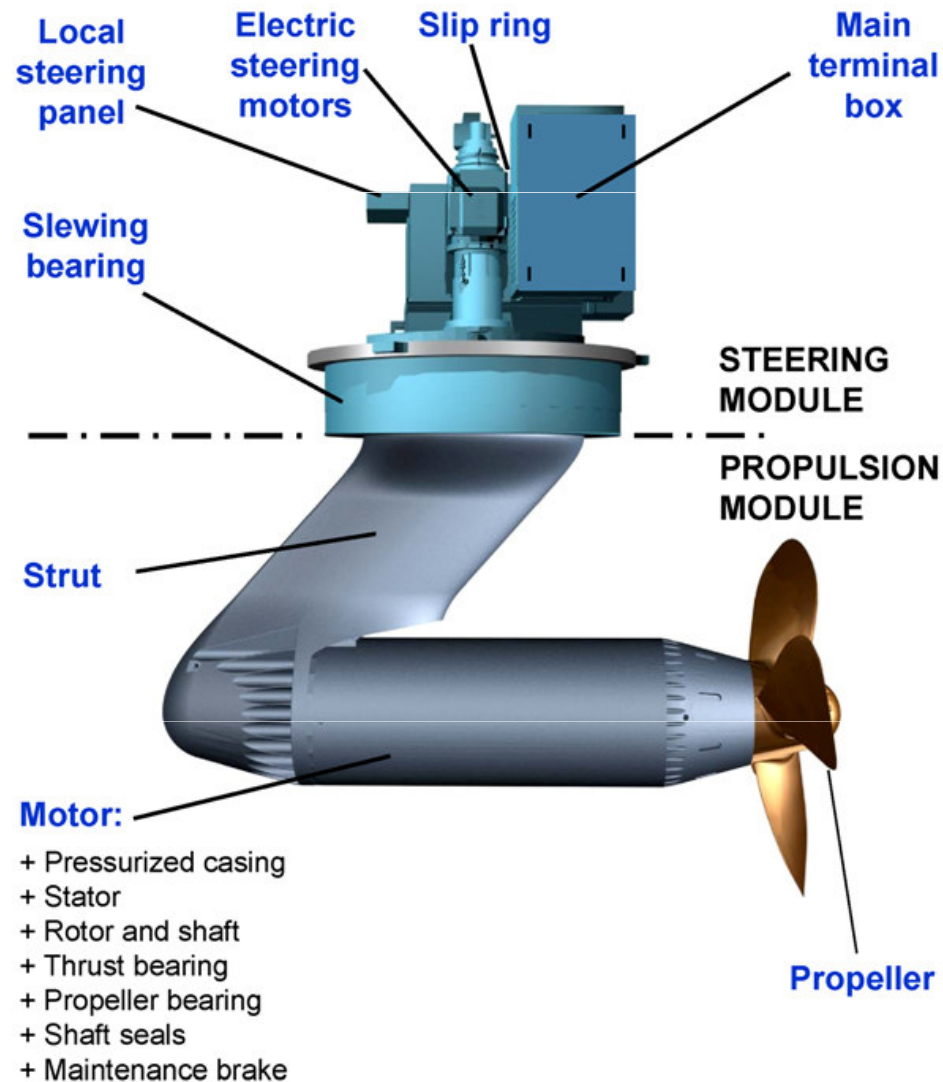


# Azipod<sup>®</sup> C - Technical Concept



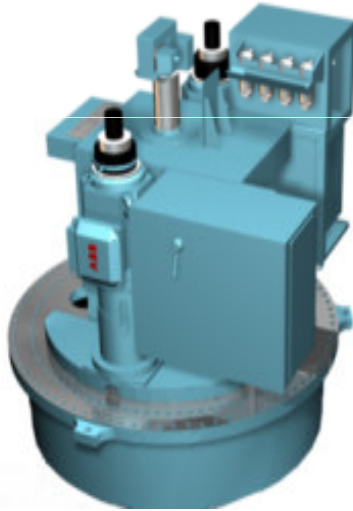
- Double shaft seal system with 2 step leakage follow up
- Positive air pressure toward sea
- Water lubricated outer seal
- No leakages

# Functional Elements of the Azipod C



# Azipod<sup>®</sup> C - Modular Construction

**3 Standard Steering Modules**



**Steering drive cabinet,  
2 units/propulsor**

**4 Standard Propulsors  
Modules**

Strut module



Motor module



Propeller





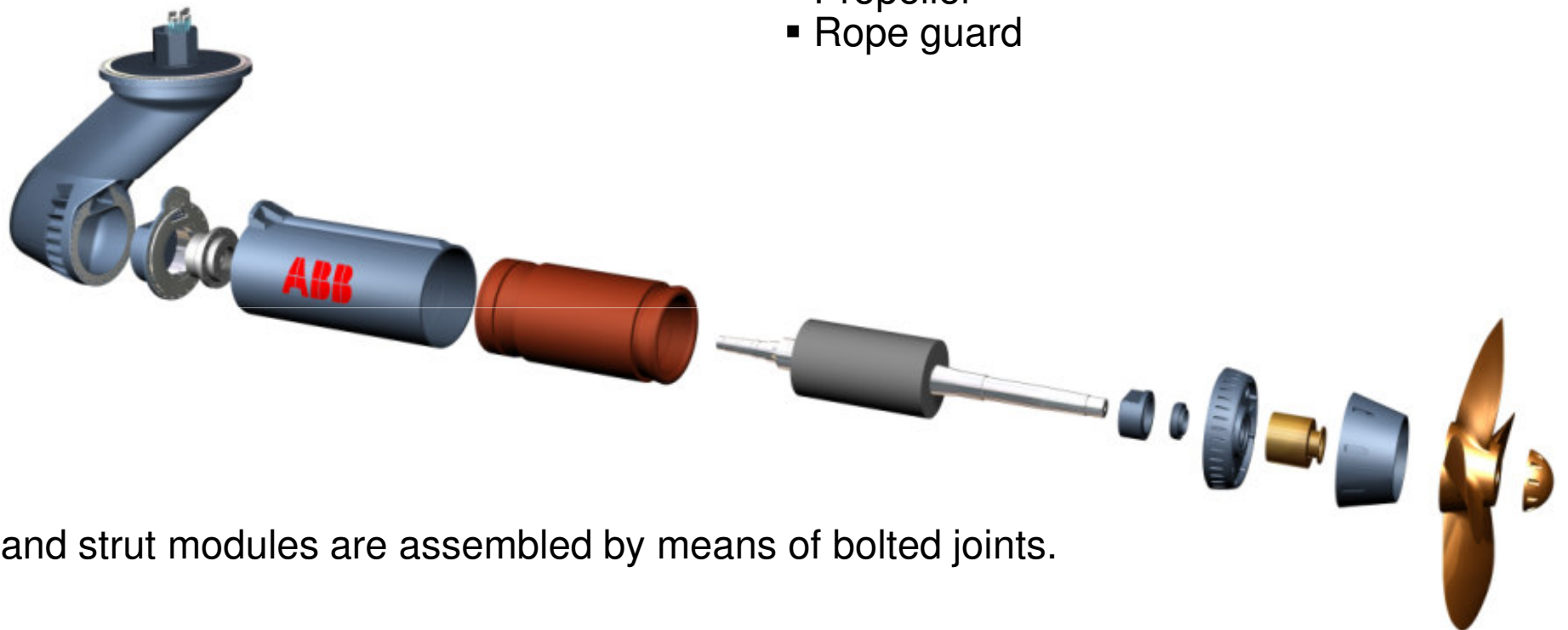
# Azipod<sup>®</sup> C - Propulsion Module

## Strut module:

- Strut casting
- Cabling
- Piping (hoses)

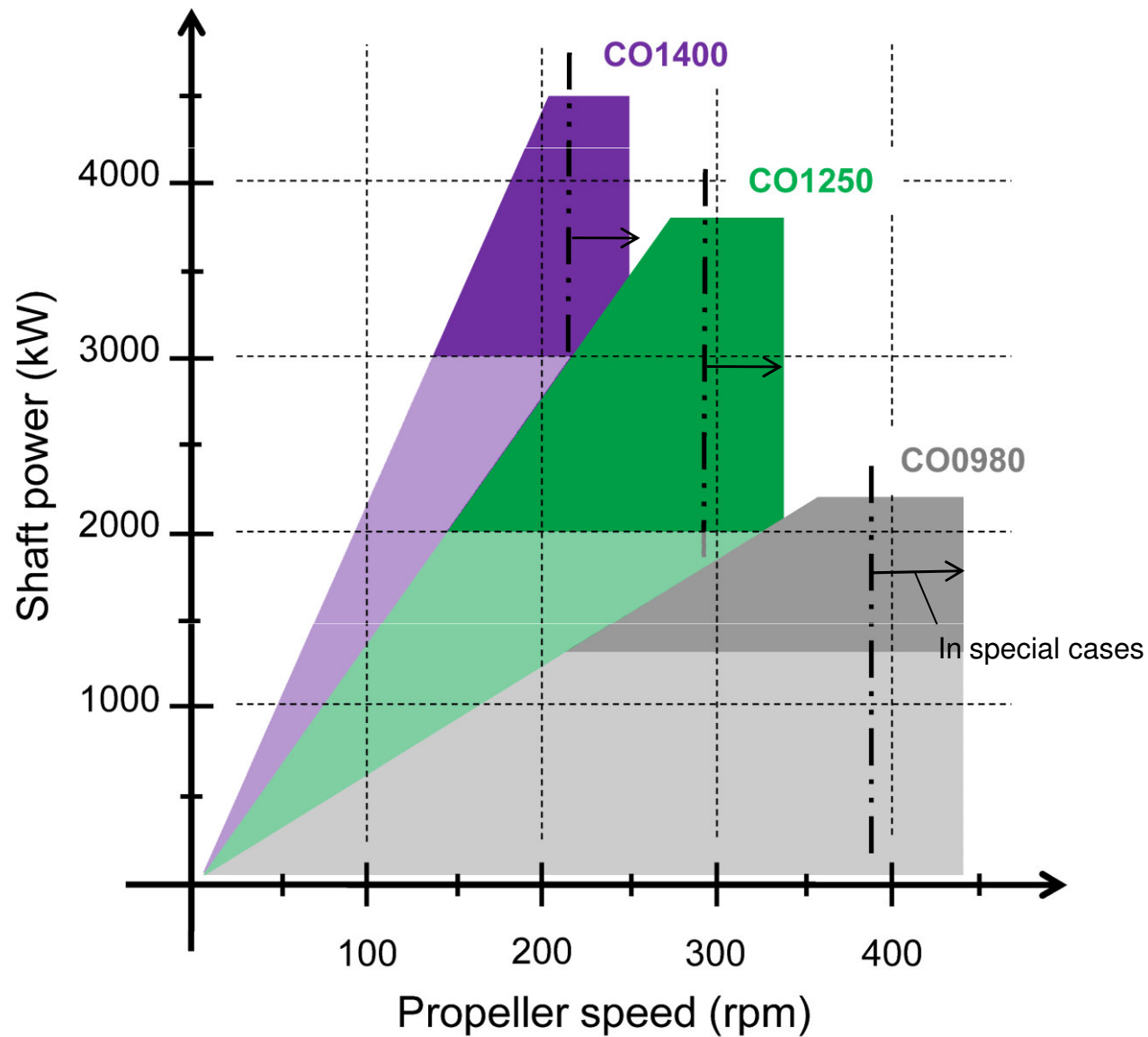
## Motor module:

- Propulsion motor
- Stator frame tube
- Thrust bearing assembly
- Propeller bearing assembly
- Shaft sealing
- Propeller
- Rope guard



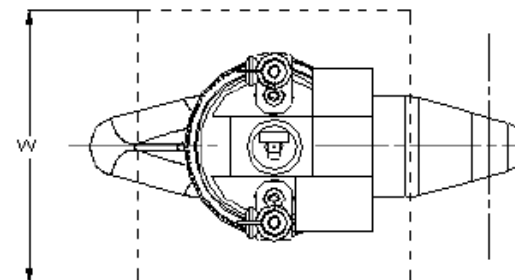
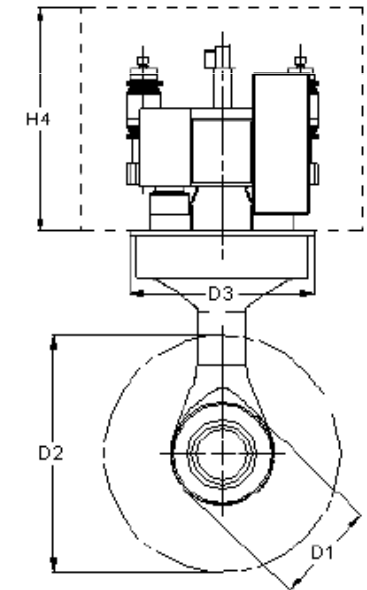
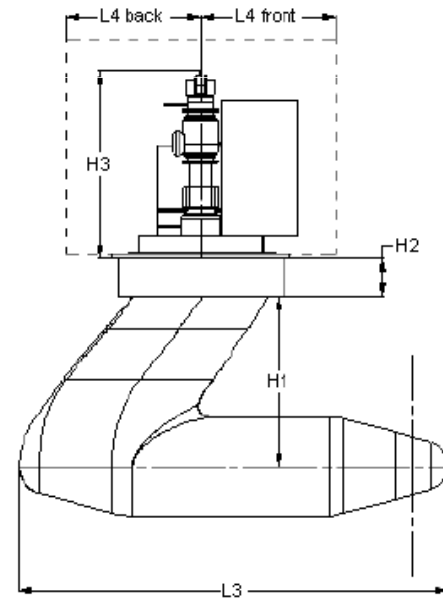
Motor and strut modules are assembled by means of bolted joints.

# Azipod<sup>®</sup> CO - Sizes



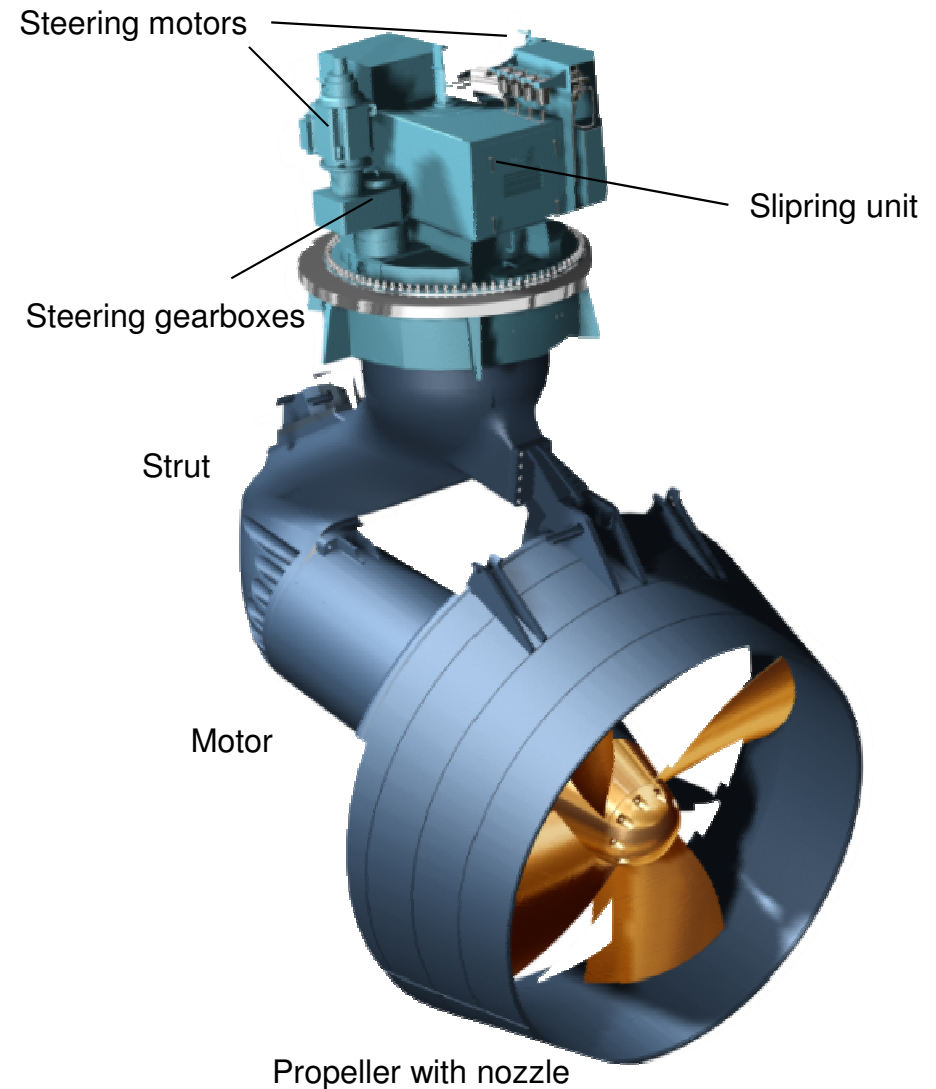
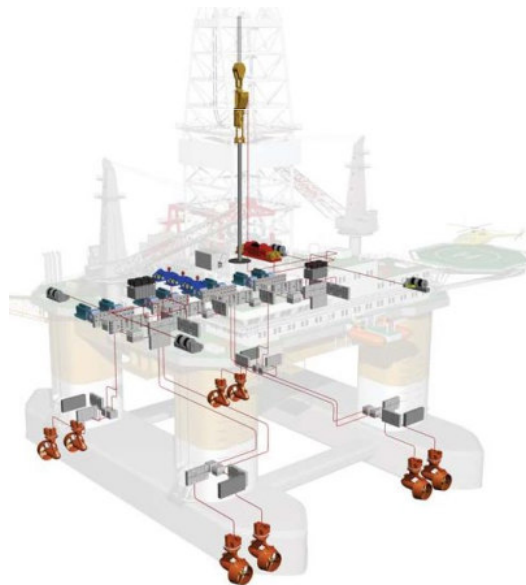
# Azipod® CO - Main Dimensions

Figure	CO0980	CO1250	CO1400
<b>D1 [mm]</b> Outer diameter of the motor	1039	1310	1470
<b>D2 [mm]</b> Propeller diameter (min. – max.)	1900 – 2600	2400 – 3500	2700 – 4000
<b>D3 [mm]</b> Connection flange outer diameter	2300	2780	2780
<b>L3 [mm]</b> Length of the Propulsion Module	4800	5730	6200
<b>H1 [mm]</b> Height from motor shaft line to the ship bottom	1950	2710	3090
<b>H2 [mm]</b> Height of slewing bearing assembly to the connection flange lower surface	495	650	650
<b>H3 [mm]</b> Height from connection flange lower surface to the top of the steering module	1980	1980	1980
<b>H4 [mm]</b> Maintenance area	2300	2300	2300
<b>L4 back [mm]</b> Maintenance area	1400	1700	1700
<b>L4 front [mm]</b> Maintenance area	2100	2250	2250
<b>W [mm]</b> Maintenance area	4000	4000	4000
<b>M1 [ton]</b> Total weight of complete Azipod	27	49	60
<b>M2 [ton]</b> Weight of the Steering Module	7	11	11
<b>M3 [ton]</b> Mass of the Propulsion Module (including approximate max. weight of propeller)	20	38	49
<b>V [m³]</b> Displacement of the Propulsion Module (at assumed draft)	4	8,5	11
<b>v [knots]</b> Maximum water speed at the Azipod	18	19	21
<b>R [mm]</b> Azipod turning radius	2700	3050	3350

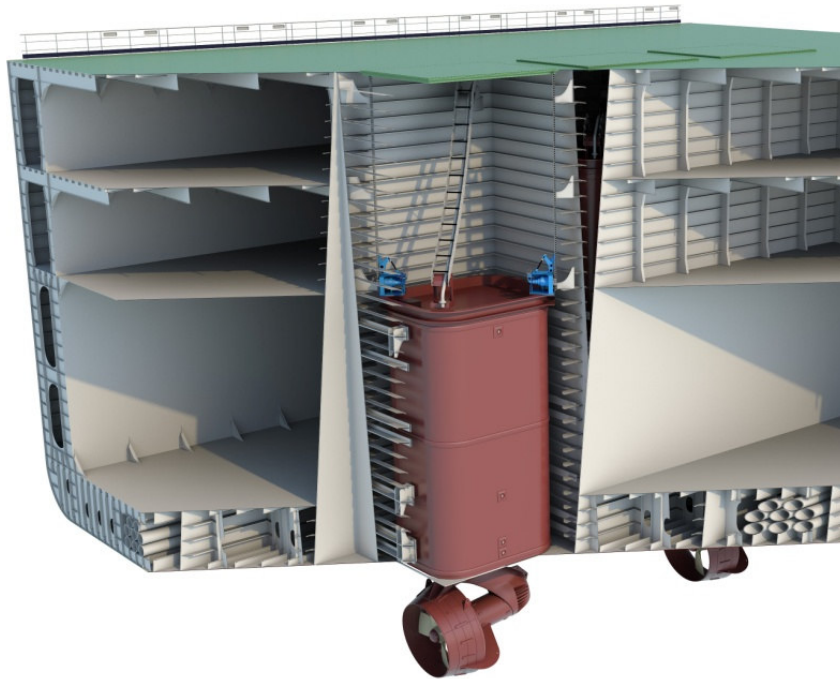


# Azipod CZ

- Designed e.g. for drilling vessels.
- Available for power ratings of up to 4500 kW.
- Static thrust up to 84 metric tons (at zero speed)
- Underwater mountable
- Optimized for DP operations

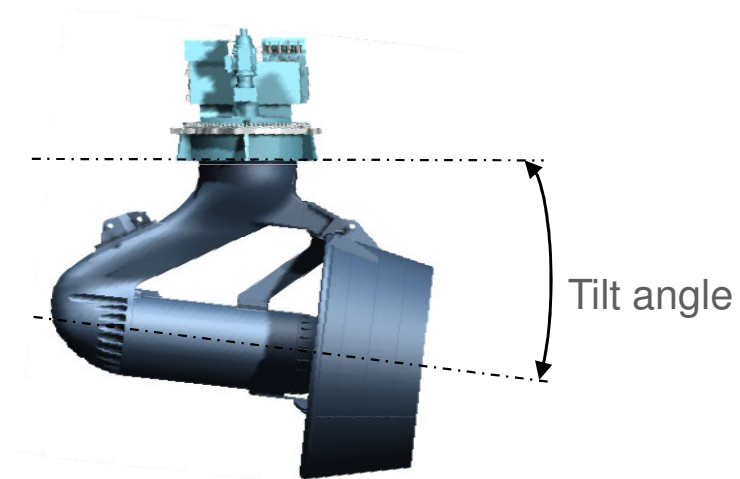
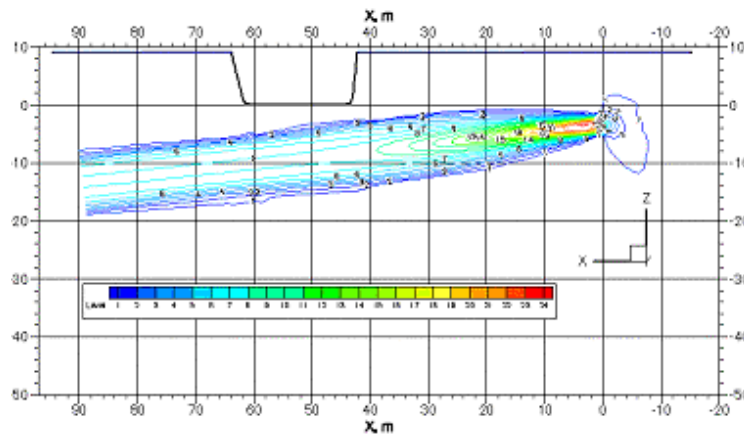


# Azipod CZ retractable unit



- Available for Azipod CZ 1400 L
- Based on canister design
- Thruster unit is underwater mountable
- Two different concepts
  - Space optimized concept
  - Maintenance optimized concept

# Azipod® CZ – Hydrodynamic Benefits

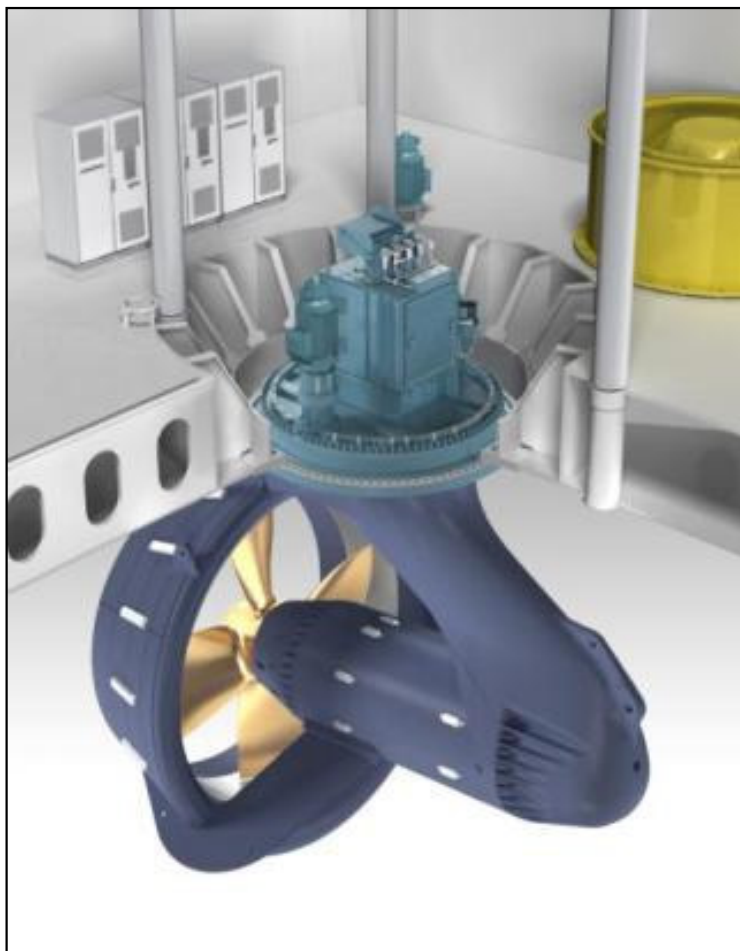


- Rig version ( = Pushing Azipod® C with Nozzle) with 7 degrees tilt angle in full scale - Minimized interaction with pontoons
- Tilting the motor module gives hydrodynamically
  - 4 - 6 % advantage to the thruster where only the nozzle is tilted
  - over 20 – 30 % advantage in thrust compared to non tilted thruster/nozzle (depends on thrust angle)

Note: Above values when thruster jet stream is in the direction of the rig's pontoon or towards other thrusters.



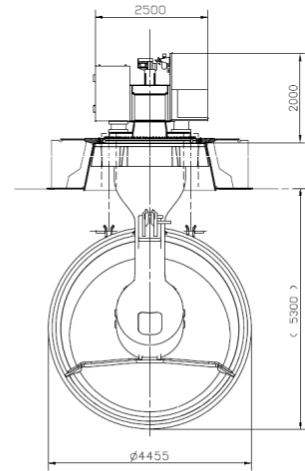
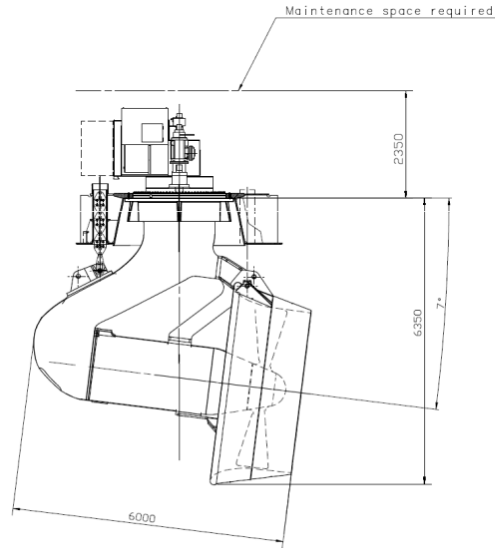
# Azipod® CZ – Model Sizes



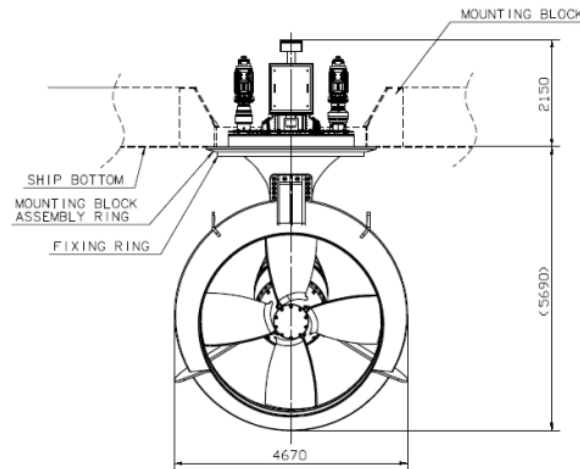
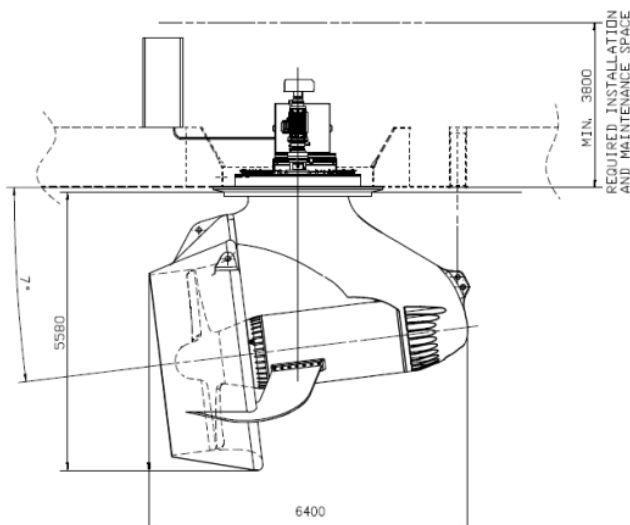
Rated power/kW	Effective thrust/tons	Max transit speed/ knots
3300	63	9
3800	73	9
3800- 4500	72 - 84	14

Thrust / kW factor ~0,185kN/kW

# Azipod<sup>®</sup> CZ – Dimensions



Azipod CZ1400S



Azipod CZ1400L

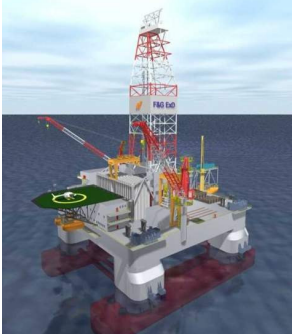
# Azipod® C Experience, June 2012



- Units delivered or on order 86 pcs
  - Azipod® CO 61 pcs
  - Azipod® CZ 25 pcs
- Vessels, total number 29 vessels
  - Supply vessels 4
  - Ferries 4
  - Research vessels 5
  - Yachts 7
  - Tankers 1
  - Drilling rigs 2
  - Crane and Heavy Lift vessels 3
  - Wind Turbine Installation vessels 2
  - Accommodation vessel 1



# Azipod® C – Summary of Benefits



## Low operation cost

Benefits of electric propulsion and power plant principle

High hydrodynamical efficiency

High internal efficiency

Minimum need for maintenance



## Environmentally friendly

Minimum amount of lubricants

Low noise and vibrations



## High reliability

Simplicity, low number of components

Minimum amount of wearing parts

Short installation and commissioning time

Power and productivity  
for a better world™

