



November, 2010

Azipod[®] C

Propulsion and Thruster Units for 1300 – 4500 kW

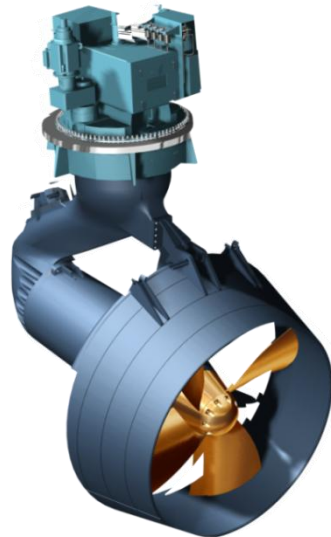
Azipod[®] C for Low Power Applications in Azipod[®] Product Family



- Azipod CO is intended for open water ship applications between 1300 ...4500 kW, such as
 - Offshore Supply Vessels
 - Mega Yachts
 - Ferries
 - Tankers
 - Research Vessels
 - Wind Turbine Installation Vessels
- 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® C - Technical Concept



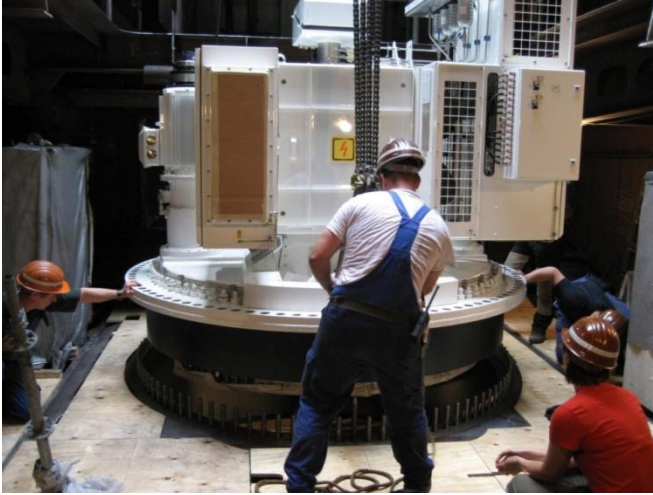
- A fully 360 degrees steerable propulsion unit
- No rudders needed
- Supplied by 690 V frequency converter
- Fixed-pitch propeller, directly mounted on the motor shaft

Azipod® 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



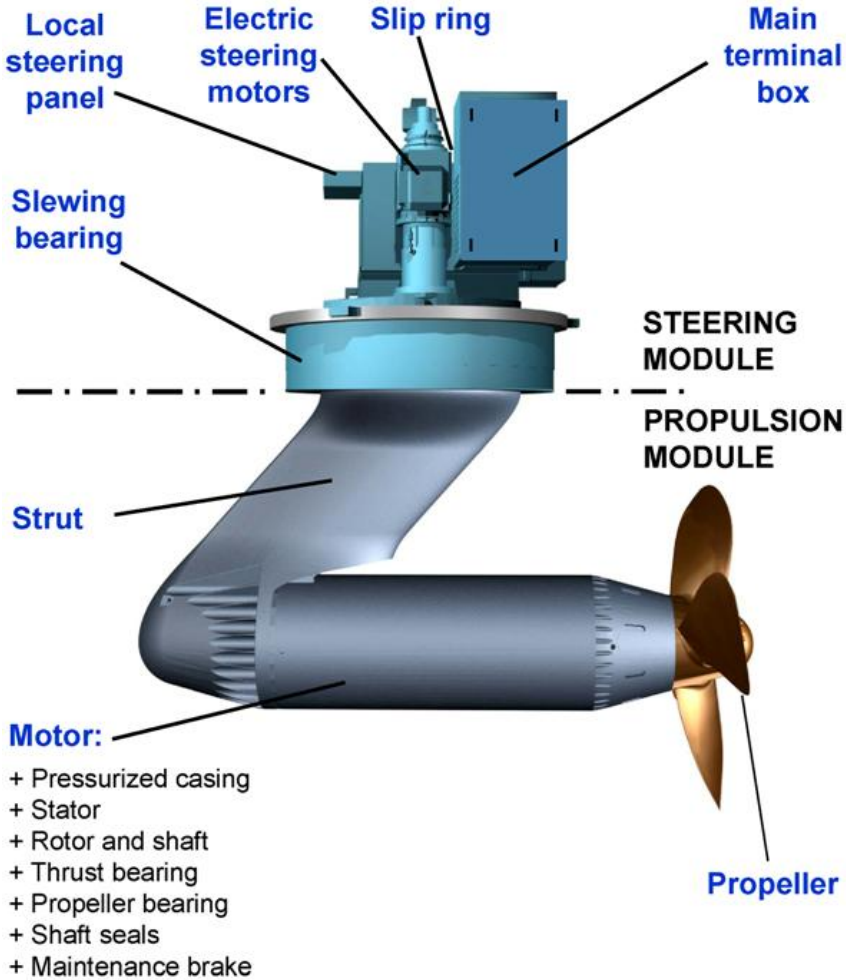
- Fully electric steering gear
- Simple installation at the yard

Azipod® 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[®] C - Modular Construction

3 Standard Steering Modules



Steering drive cabinet,
2 units/propulsor

4 Standard Propulsors Modules

Strut module



Motor module



Propeller



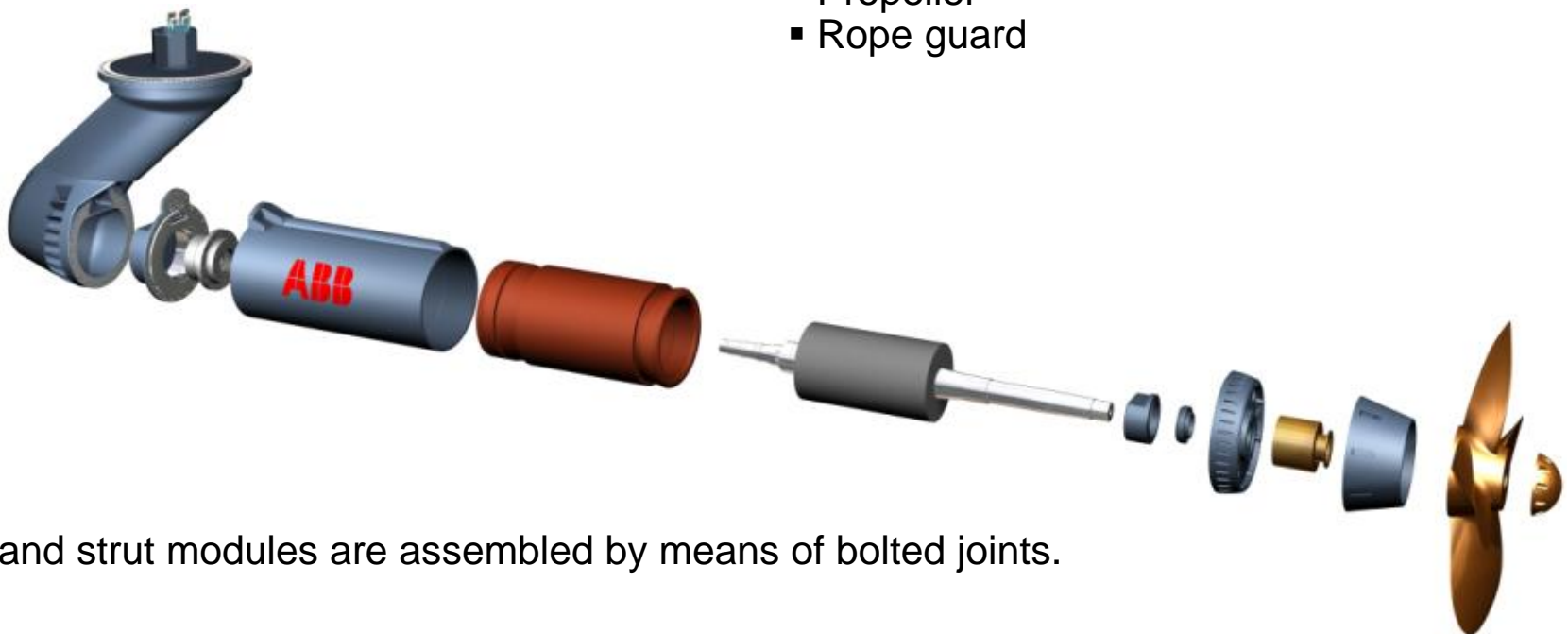
Azipod® C - Propulsion Module

Strut module:

- Strut casting
- Cabling
- Piping (hoses)

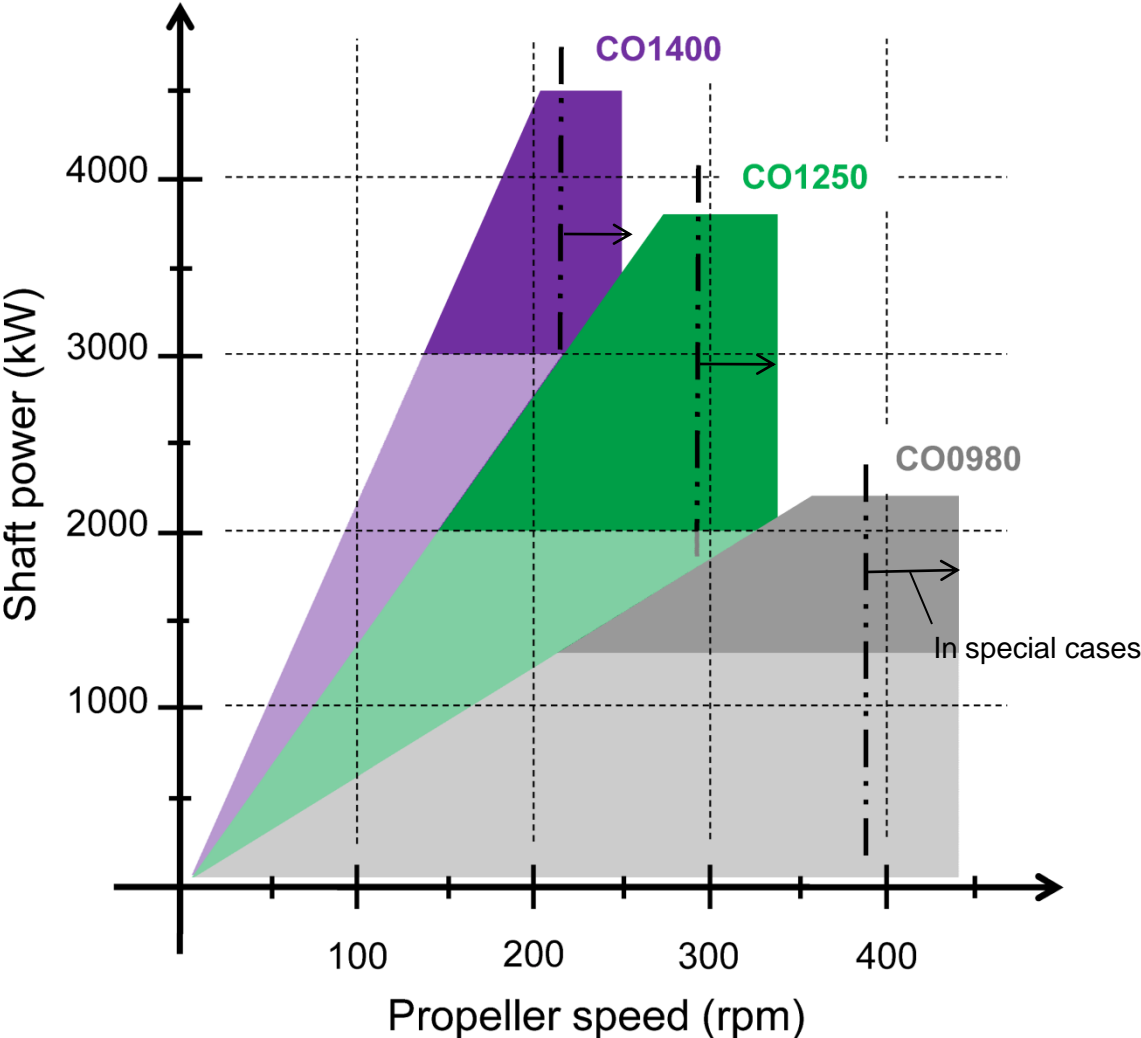
Motor module:

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



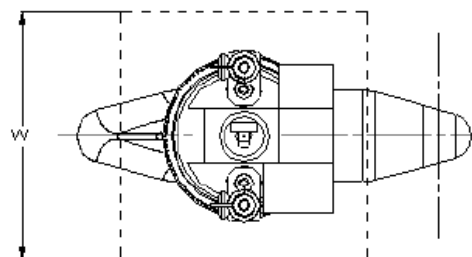
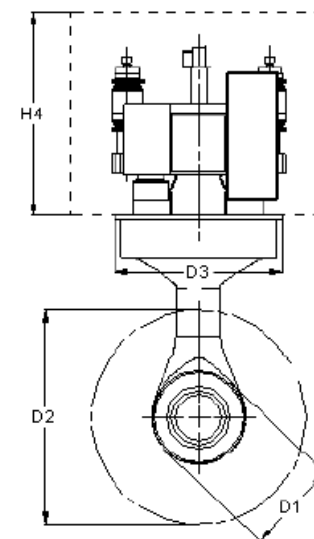
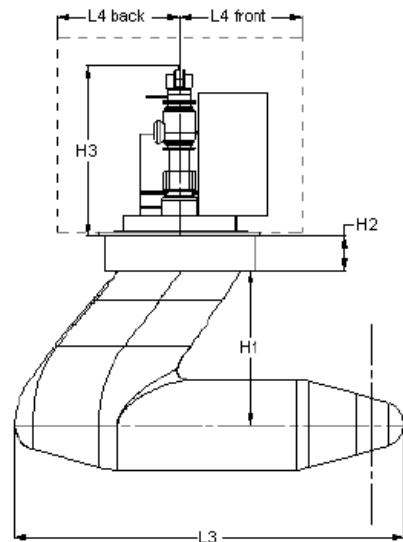
Motor and strut modules are assembled by means of bolted joints.

Azipod[®] CO - Sizes



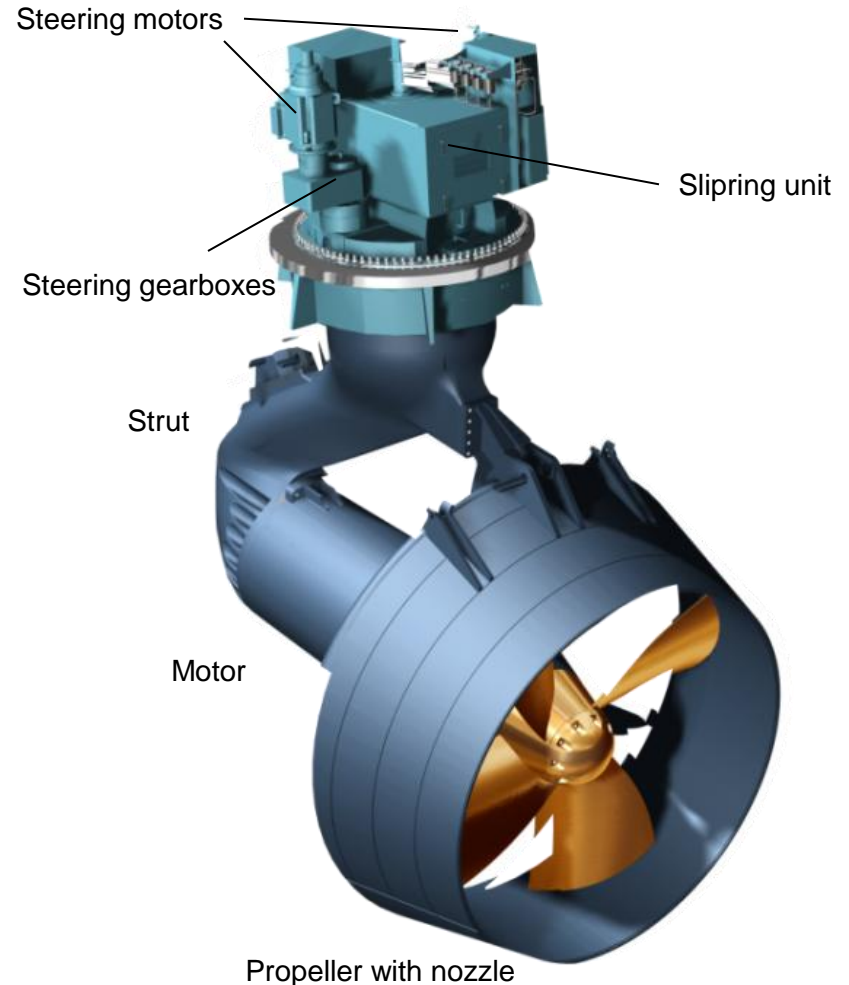
Azipod[®] CO - Main Dimensions

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

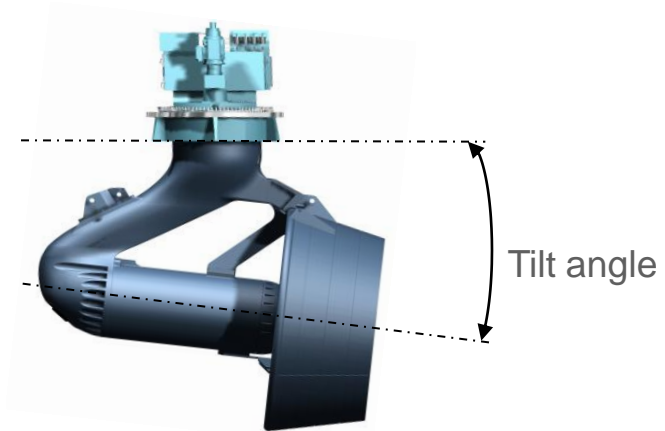
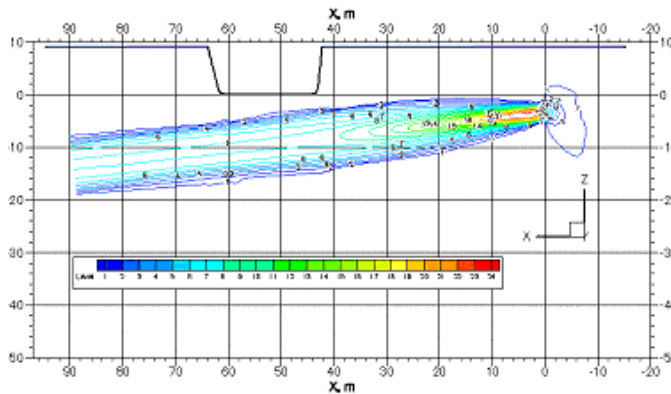


Azipod CZ

- 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



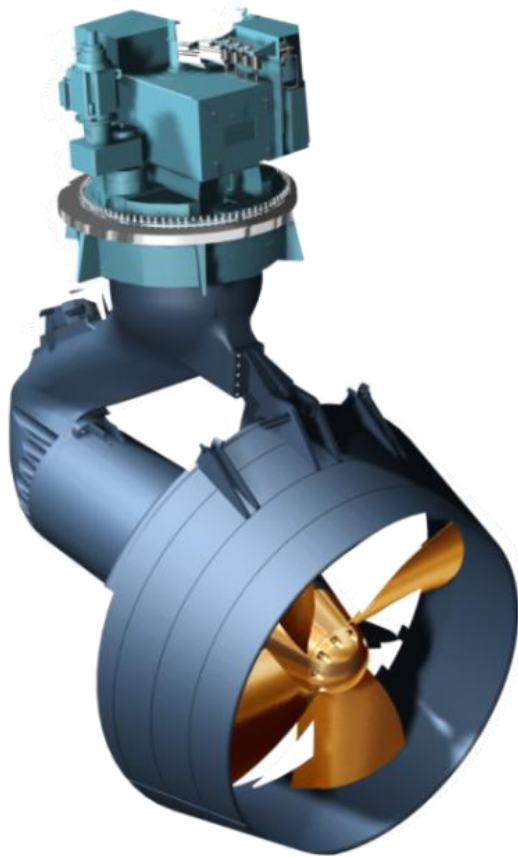
Azipod[®] CZ – Hydrodynamic Benefits



- 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)

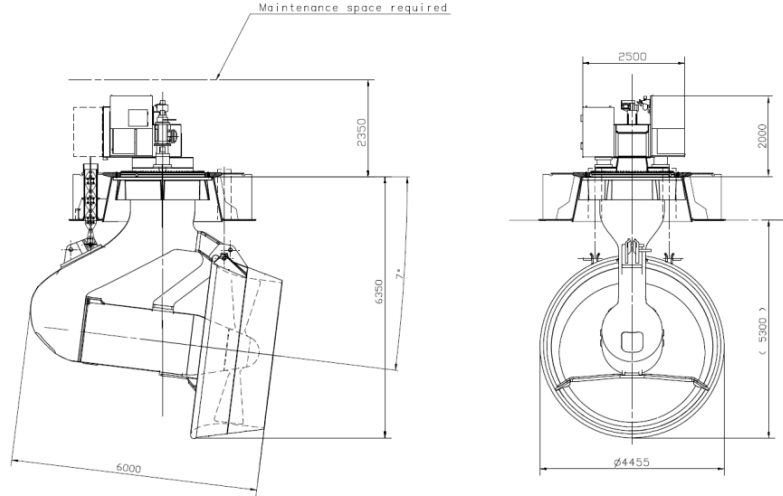
Note: Above values when thruster jet stream is in the direction of the rig's pontoon or towards other thrusters.

Azipod[®] CZ – Model Sizes

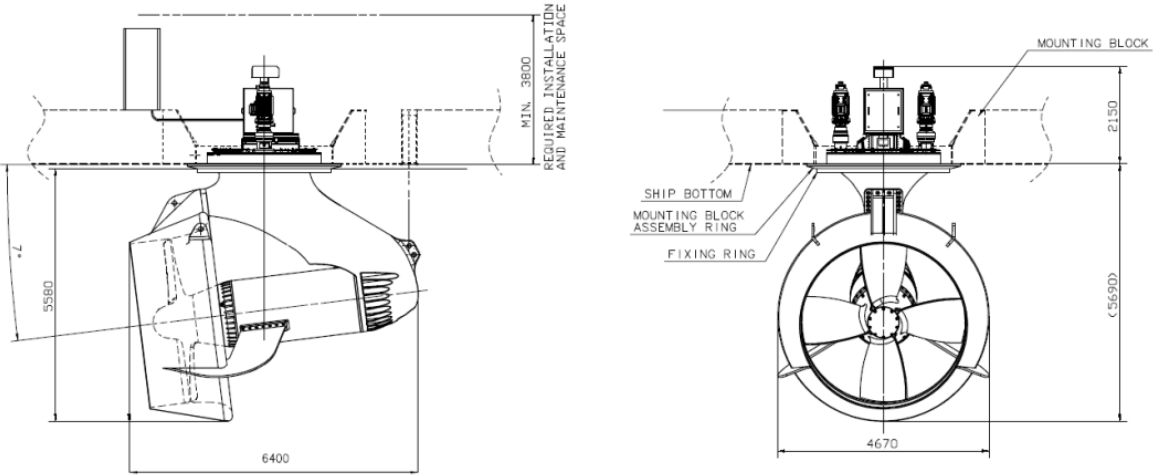


| Rated power/kW | Effective thrust/tons | Max transit speed/ knots |
|----------------|-----------------------|--------------------------|
| 3300 | 63 | 9 |
| 3800 | 73 | 9 |
| 3800- 4500 | 72 - 84 | 14 |

Azipod® CZ – Dimensions



Azipod CZ1400S



Azipod CZ1400L

Azipod® C Experience, Nov 2010



- Units delivered or on order (incl spare units) 75 pcs
 - Azipod® CO 50 pcs
 - Azipod® CZ 25 pcs
- Vessels, total number 26 vessels
 - Supply vessels 4
 - Ferries 4
 - Research vessels 5
 - Yachts 7
 - Tankers 1
 - Drilling rigs 2
 - Crane and Heavy Lift vessels 2
 - Wind Turbine Installation vessels 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™

