

Scientific Equipment

'Polarstern' is a well equipped multi-disciplinary research vessel. It has a spacious and heated wooden work deck. Eight winches are available for the deployment of oceanographic, biological, geological and geophysical gear, down to great depths. Two telescope beams with a reach of three metres extend over the side of the ship. There is a 15 ton crane with a working radius of 4 to 24 metres, the head of which can be lowered to the sea surface in order to minimize the swinging of instruments attached to it. Together with another 25 ton crane at the bow of the vessel, 'Polarstern' is thus also perfectly fitted for supply work.

Bottom and midwater trawling for biological research as well as towing of heavy geological and geophysical gear is done with the aid of an A-frame at the stern. Echosounders are available for navigation and fish location, and a 'Hydro-sweep' with a depth range of over 10,000 metres is used to map the sea bottom, while the narrow beam 'Parasound' penetrates the sea bottom to depths of 150 metres. Two helicopters can be stationed on 'Polarstern' to enable research work at some distance from the vessel.



RV 'Polarstern' has nine scientific laboratories as well as laboratory containers which can be installed on deck or in specially designed holds below deck.

An extensive computer system is available for online-data acquisition and postprocessing. Meteorological, oceanographic and other data can thus be directly coupled to continuously recorded navigation data.

Three scientific cold rooms operated at temperatures between -32°C and $+5^{\circ}\text{C}$ are available to store ice and other samples at *in situ* temperatures. 'Polarstern' is also equipped with an aerological station for atmospheric radiosonde soundings as well as a meteorological station capable of receiving online satellite images.

Technical Data

Overall length	118 metres
Length between end Perpendiculars	110.5 metres
Maximum beam	25 metres
Height to main deck Draught	13.6 metres max. 11.21 metres
Displacement at maximum draught	17,300 tons
Weight of empty ship	11,904 tons
Engine output (4 engines)	approx. 14,000 kw (or 20,000 HP)
Maximum speed	16 knots
Economical cruising speed (2 - 3 engines)	10 - 12 knots
Classification:	Germanischer Lloyd, 100 A 5 Arc 3, MC Arc 3 Aut 16/24.

◀ Unloading on the sea ice
(photo: PKH, Stark)

Title photo: D. Fütterer ▶

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RV 'Polarstern'

Polar Research and
Supply Vessel
of the Federal Republic
of Germany

Alfred Wegener Institute
for Polar and Marine Research
in the Helmholtz Association

 HELMHOLTZ
ASSOCIATION

Polar Research and Supply Vessel

Between 1980 and 1985, the Federal Republic of Germany established the technical infrastructure for a long-term scientific engagement in the polar regions:

This includes the Alfred Wegener Institute for Polar and Marine Research (AWI) in Bremerhaven the polar research and supply vessel 'Polarstern', polar aircraft, as well as the permanently occupied research stations 'Neumayer' in Antarctica and 'Koldewey' (since 1991) on Spitsbergen in the Arctic.

Since its commissioning in 1982 up to 2009, 'Polarstern' has carried out 49 campaigns to the Arctic and Antarctic. At present it is one of the most advanced polar research vessels worldwide, planned to work throughout the polar seas including the pack-ice zone, one of the least explored regions, but one of the most important regarding the regulation of global climate.

The vessel is equipped for multidisciplinary research, including the fields of biology, geology, geophysics, glaciology, physics, chemistry and meteorology.



▲ Wet lab (photo: J. Plötz)



◀ RV 'Polarstern'
(photo: S. Schiel)

'Polarstern' is a double-hulled ice-breaker capable of operating at temperatures down to -50°C , thus enabling her to winter over in the polar seas. The ship is also used to supply the 'Neumayer III' Station and other stations and sites, where German scientists are working.

The vessel has a crew of 39 to 44, and provides working facilities for up to 50 scientists and technicians. Extra berths are available for passengers in transit to Antarctic stations or to expeditions on the Antarctic ice shelves or islands. Apart from German investigators, many scientists from other countries regularly participate in 'Polarstern' cruises.

'Polarstern' was built and equipped at Howaldtswerke/Deutsche Werft in Kiel, and at Werft Nobiskrug in Rendsburg. The special ice-breaking design was developed by HSVA (Hamburgische Schiffsbau-Versuchsanstalt). The Federal Ministry for Education and Research (BMBF) owns the 'Polarstern' and it is run by the Alfred Wegener Institute for Polar and Marine Research in Bremerhaven. It is operated by the shipping company Laeisz GmbH in Bremerhaven.

Cruises are planned and coordinated by the Institute, with the assistance of a scientific board. Integration of

national research activities into international research programmes is given high priority.

'Polarstern' can break sea ice up to 1.5 m thickness at constant speed. Multi-year ice and pressure ridges can be overcome by ramming.

The vessel is propelled by four diesel engines, two of which together drive one of the two variable-pitch

propellers. Side thrusters, fore and aft make the vessel highly manoeuvrable. Its excellent perfor-



▲ Bottom trawl (photo: AWI)

mance at sea is due to stabilizer fins and a roll-damping and balancing system.

The vessel is equipped with the latest technology of navigation and communication equipment. It is navigated by GPS (Global Positioning System). Exact positioning is obtained by joystick steering. An integrated navigation system which permits automatic cruising and accurate dynamic manoeuvrability is available for scientific use.