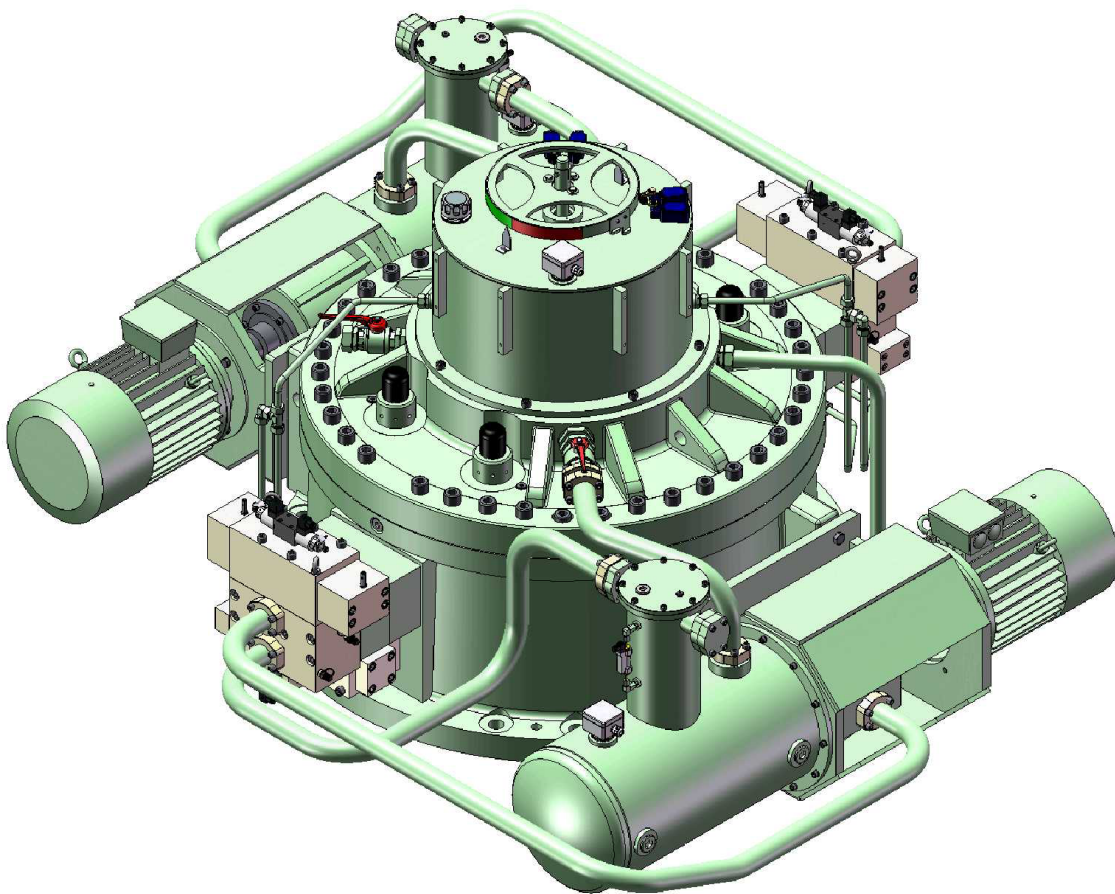


PORSGRUNN Steering Gear

The rotary vane steering gear is an approved and preferred space saving system which makes the steering robust and safe. One of the main advantages is maximum torque over the full rudder range.



Porsgrunn steering gear STD

Porsgrunn rotary vane steering gear are equipped with a low pressure on/off hydraulic system as standard. Our steering gear can be adapted to special applications due to the compact design.

The "Standard" type is designed for rudder torque up to 5,856 kNm, and fits all rudder types. It is capable of angles up to 2x65 degrees, and is suitable for all types of vessels, e.g. dry cargo vessels, RoRo-ferries, cruise vessels, container ships and tankers/gas carriers below 100K dwt (non duplicated actuator). Porsgrunn steering gear fulfills the single failure criteria, according to SOLAS and all Class rules.

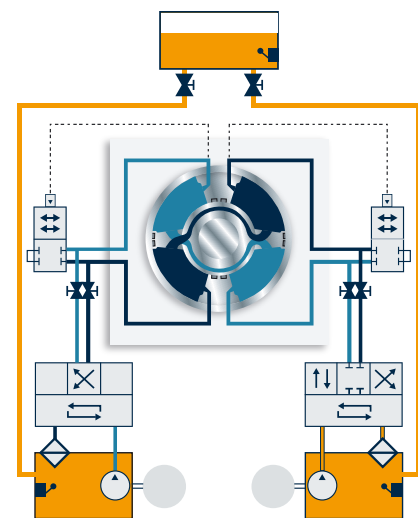
The chambers in the actuator are diagonally connected through channels in the rotor, and the directional valves are mounted directly on the actuator. In case of loss of oil-pressure from the pump, the main spool will automatically go to centre position and close. The actuator is fully operational with the other HPU. Our dynamic sealing system has very reliable sealing – spring loaded cast iron bars.

Compared with steering gear equipped with synthetic sealings, our solution does not require maintenance or replacement during steering gear lifetime.

The integrated radial bearings and the rudder carrier are all made of bronze. The bearings are shrunk fitted into the bottom of the housing and the cover, and lubricated

by the system oil. The rudder carrier is integrated in the steering gear and lubricated by the system oil.

For the smaller models (torque range up to 1385 kNm) the integrated power units makes the complete actuator very compact in size. Piping is ready bent and Class approved in our workshop. With no external foundations for the power units, and no piping work necessary for the yard, the actuator is very easy to install. Oil injected key-less fit to rudder stock (all types) makes both installation and removal easy.



STD models	Rudder stock diameter D (mm)	Max. working pressure (bar)	Torque at max. working pres. (kNm)	Max. mechanical rudder angle (degrees)	Weight approx. (kg)	Load radial/vertical (kN)
370-60/2	370	75	600	2 x 65	5900	1300 1150
425-80/2	425	65	820	2 x 67	7400	1650 1200
425-95/2	425	75	920	2 x 67	7600	2000 1500
465-140/2	465	75	1385	2 x 65	9900	2200 2000
550-200/2	550	75	2000	2 x 70	15200	3500 2500
650-325/2	650	75	3250	2 x 65	23500	4900 3400
650-400/2	700	75	4000	2 x 65	31000	5400 3900
800-600/2	800	75	5850	2 x 60	44000	7500 4500

Subject to changes without notice

Porsgrunn steering gear IMO

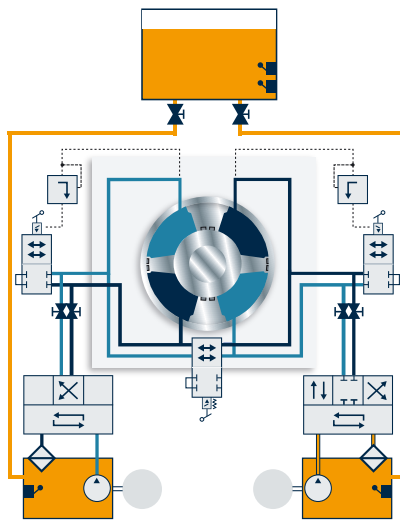
Our IMO series are suitable for oil-, gas- and chemical tankers above 100K dwt. Models in the IMO series have a separation system that divides the actuator in two independent parts.

The chambers in the actuator are diagonally connected through channels in the cover. These channels can be closed by means of a cross connection valve. As long as the cross connection valve is open, the actuator works as a standard steering gear. When the cross connection valve is closed, the actuator is separated in two independent parts.

Porsgrunn steering gear IMO series is designed for torque from 1600 kNm to 5,850 kNm. All types can be supplied with different power unit arrangements; 2x100% (except 800-600/2), 2 x 50% or 3 x 50%. The IMO series have a minimum of valves and piping, due to the channels in the actuator cover.

As for the Porsgrunn steering gear standard type, the IMO type has the same reliable dynamic sealing system – spring loaded cast iron bars. This solution does not require maintenance or replacement during steering gear lifetime.

The IMO types also have the integrated bronze radial bearings and the rudder carrier, which similar to the standard type are shrunk into the bottom of the housing and the cover, and lubricated by the system oil.



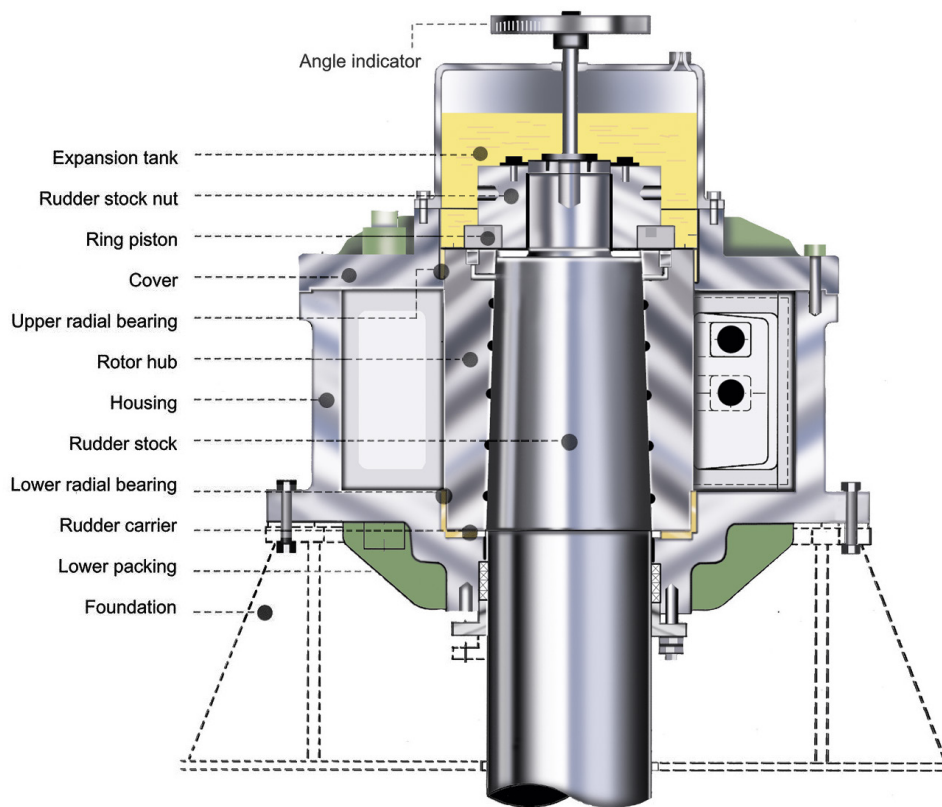
IMO models	Rudder stock diameter D (mm)	Max. working pressure (bar)	Torque at max. working pres. (kNm)	Max. mechanical rudder angle (degrees)	Weight approx. (kg)	Load radial/vertical (kN)	
550-200/2	550	75	2000	2 x 65	17500	3500	2500
650-325/2	650	75	3250	2 x 65	25500	4800	3400
650-400/2	700	75	4000	2 x 65	34000	5400	3900
800-600/2	800	75	5850	2 x 60	44000	7500	4500

Subject to changes without notice

The original rotary vane solution

The rudder angle indicator shows the rudder angle and is fixed to the rudder stock. The expansion tank contains the system oil. The rudder stock nut is a securing device for the friction connection between the rudder stock and the rotor. The upper and lower radial bearings takes up the radial forces.

The rotor is the moving part of the actuator, and turns the rudder stock by means of hydraulic pressure on the vanes. The rudder stock connects the rotor and the rudder. The rudder carrier carries the weight of the rotor, rudder stock and rudder. The rudder carrier, upper bearing and lower bearing is lubricated by the system oil.



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