

US AZIMUTH THRUSTER FAMILY



KONGSBERG



KONGSBERG MARITIME AZIMUTH THRUSTERS

Integrated heavy duty slipping clutch for US azimuth thruster family

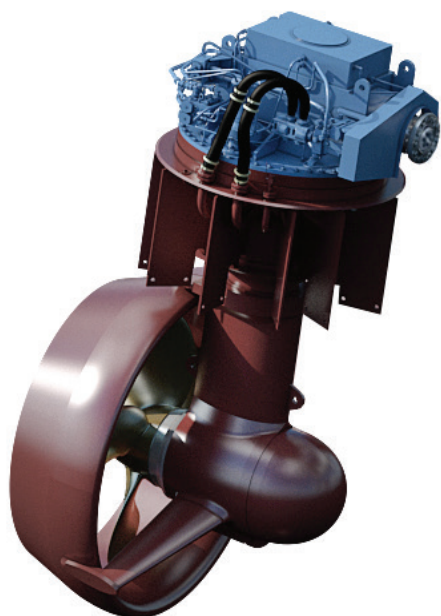
US with heavy duty slipping clutch

Many vessels are equipped for external firefighting with fire pumps and monitors, enabling them to tackle fires on other vessels at sea or in waterfront property. Typically these systems are found on tugs, offshore support vessels and harbour service craft. Monitors delivering jets of water at a long distance require powerful fire pumps. For example the lowest FiFi rating calls for 2,400m³ of water per hour, and this can be provided either by pumps driven by the vessel's main engines or by separate diesel engines.

To do its job the firefighting vessel has to hold itself in position against wind, waves and current, and also against the strong recoil force from the jets thrown by the fire monitors. Diesel engines driven by mechanical transmission azimuth thrusters with fixed pitch propellers are a popular and effective propulsion system.

Engine speed determines propeller thrust and vessel speed, but the simple system raises a question when a main engine also drives a fire pump; how to divide the power between thruster and pump in the right proportion? The pump wants a high and constant engine speed to give the required power, but the power to position the vessel, thus fixed pitch propeller speed, can be quite low and variable.

Popular Kongsberg Maritime US205 and US255 thrusters are now available with a simple and elegant answer; an integrated heavy duty slipping clutch.



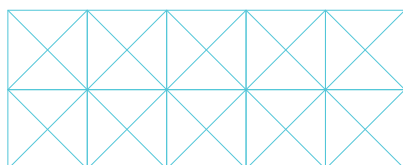
Our development was prompted by a query from a customer. Could the clutch already built into these thrusters be used to control the power fed to the propeller? This customer was considering the potential cost saving of not needing to buy a separate slipping clutch, thrusters with CP propellers, or a separately engine-driven pump system, which are valid but more expensive solutions.

These US series thrusters incorporate as standard a multiplate clutch in the drive to the upper gearbox pinion. Hydraulically operated, its function is to provide a smooth engagement when the thruster is coupled in with the engine running at idling speed. Here the friction heat generated by the slipping clutch is small, about 25kW for a short period. To provide control of propeller speed for long periods while running the engine at higher speed involves the clutch in slipping away many times this amount of energy as heat. The solution was to include a multiplate hydraulically operated clutch with variable pressure to define the amount of slip. When slipping, the plates are less tightly clamped to allow a large flow of lubricating oil to flow from the inside to the outside of the clutch pack between the plates, the oil carrying with it the heat. Little modification to the thruster was needed, and the main external change is the provision of a much larger oil cooler to cope with the heat representing the power slipped.

The result is very good control over propeller revs when the fire pump is operating, and the clutch functions as before when the thruster is coupled in but the fire pump is not needed.

TECHNICAL DATA

US	55P4	105P6	105P9	155P12	155P14	205P18	205S	205P20	255S	255P30	255S	35	305	355	60
Max. power kW (non DNV)	350	500	750	1100	1350	1550	2000	2000	2560	2560	2600	2900	3300	3800	5000
Max. power kW (DNV)	260	400	650	880	1100	1250	1500	1500	2200	2200	2200	2500	3000	3700	5000
Input speed rpm	1500-2100	1500-1800	1000-1800	750-2000	750-2000	750-1800	750-1800	750-1800	750-1800	750-1800	750-1800	750-1800	750-1600	720-1200	750-1200
Built-in clutch type	On/off	On/off LD slip	On/off LD slip	On/off LD slip	On/off LD slip	On/off LD slip	On/off HD slip	On/off LD slip	On/off LD slip	On/off LD slip	On/off LD slip	On/off LD slip	On/off LD slip	On/off LD slip	On/off
Propeller dia mm	1050	1300	1500 1600	1600 1800	1800 2000	2200	2300 2400 2500	2300 2400 2500	2600 2700 2800	2600 2700 2800	3000	2800 3000	3000 3200	3200 3500	3800 4000
Stem length mm	1500 (+125mm step)	1850 (+125mm step)	2250 (+125mm step)	2500 (+125mm step)	2620 (+125mm step)	3000 (+125mm step)	3095/ 3305	3305 (+125mm step)	3600/ 3800	3800 (+125mm step)	3730/ 3930	3650 (+125mm step)	4100 (+125mm step)	4600 (+125mm step)	5000 (+250mm step)
Weight tons	1.9	3.6	6	9.5 11	11.5 12.5	18	16 17 18	18 19 20	25 26 27	26 27 28	30	36 37.5	41 43	54 56	78 82
Max. BP mtons with 2 thrusters	11	17	24 26	30 36	37 44	52	60 65 67	60 65 67	78 82 86	78 82 86	91	89 97	102 111	115 130	160 172



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