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Global Leader

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HYUNDAI

ENGINE & MACHINERY DIVISION
Programme 2014

ENGINE & MACHINERY DIVISION Programme 2014

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 **HYUNDAI**
HEAVY INDUSTRIES CO., LTD.
ENGINE & MACHINERY

A00-133-03 Jan. 2014
Contents subject to change without prior notice



Introduction

As one of the leading engine builders in the world, the Engine & Machinery Division of Hyundai Heavy Industries Co., Ltd. (HHI-EMD) has enjoyed its reputation since its beginning in 1978. HHI-EMD has taken up 35 % (≥ 50 mm bore) of the world's market share in 2-stroke engines covering marine and stationary purposes.

This shows that the superior quality of HYUNDAI engines has been recognized by customers all over the world. HHI-EMD developed its own specially designed HIMSEN engine as part of ongoing efforts to provide the most practical and highest quality engines to its customers.

Key advantages of the HIMSEN engine include reliability, durability, long service intervals, easy maintenance, operational economy, and environmental friendliness.

Based on its leading position in engine production, HHI-EMD has become the forerunner in the sector of engine power generation as well.

A great number of its domestic and overseas engine power plants have shown superb performance, adding to the HYUNDAI reputation.

The business activities of HHI-EMD have been further expanded into diverse fields of industrial machinery such as Robot & System, Industrial Machinery System, Industrial & Marine Pumps, Marine & Industrial Turbines, Ballast Water Treatment System, Side Thruster, Azimuth Thruster, Hi-GAS, NoNOx, Air & Gas Compressors, CP & FP Propellers and Marine Gear Box.

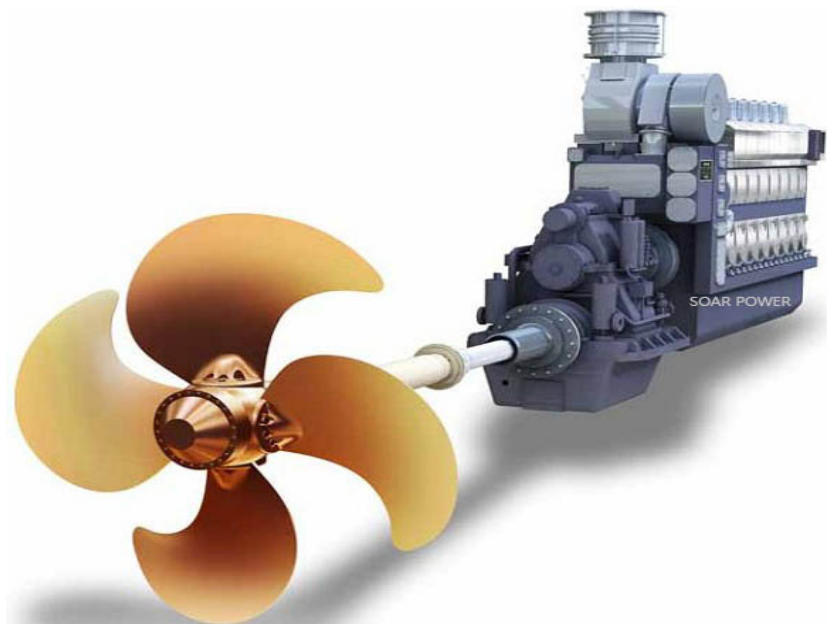


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HiMSEN...

The best solution for all types of marine vessels and offshore applications with proven reliability, low emission, low operation cost, multi-fuel capability...Our extensive R&D facilities enable H-H to provide the customers with high quality and excellent services in all phases of designing, production, assembly and commissioning of HiMSEN propulsion packaged system.

Marine Propulsion System



Long Term Commitment...

To provide the market with reliable, cost effective and earth-friendly solution

Optimized Matching of HiMSEN Propulsion Package

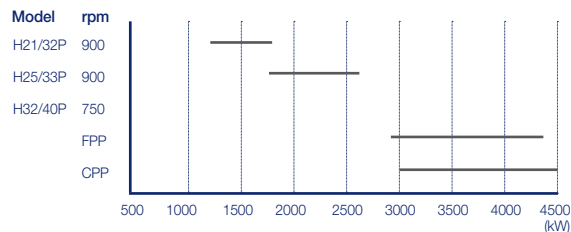
- HiMSEN H21/32P, H25/33P and H32/40P engine
- C.P./F.P. propeller with shafting
- Pitch and speed control
- Load control
- Reduction gear
- Shaft generator
- Auxiliary machinery

Application

- Controllable pitch propulsion
- Fixed pitch propulsion
- Azimuth thruster propulsion
- Pump drive

Excellent Performance of HiMSEN Propulsion Engine

- Improved transient operation with pulse charging turbocharger
- Invisible smoke with pulse charging turbocharger by part loadmatching
- Lower thermal load engine with lower exhaust gas temperature
- Low fuel consumption
- Low NOx emission



Power Range

H21/32P	1,200~1,800 kW
H25/33P	1,740~2,610 kW
H32/40P	2,880~4,320 kW / FFP
	3,000~4,500 kW / CPP

Marine Propulsion System



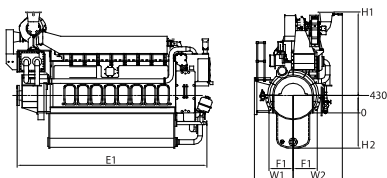
H21/32P | Bore: 210 mm, Stroke: 320 mm

Controllable Pitch Propeller

Permit high skew angles to minimize noise and vibration.

Fixed Pitch Propeller

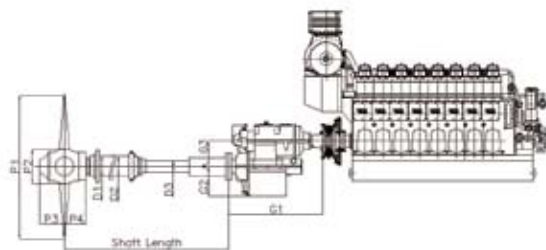
Guarantee optimum thrust, minimal noise and vibration level.



Dimensions

900 rpm	cyl.	Rated Output at Engine (kW)	Engine dimension (mm) & dry weight (ton)					
			E1	H1	H2	F1	W1	Dry Weight
6	1,200	3,904	2,287	1,120	595	955	1,126	18.0
8	1,600	4,634	2,541	1,300	595	955	1,214	21.0
9	1,800	4,994	2,541	1,300	595	955	1,214	23.0

Specific Fuel Oil Consumption at 100 % Engine Load: 183 g/kWh (without pumps)



Engine Type	CPP Model	Gear ratio	rpm	Diameter Ø mm (P1)	Min. Dia.	Max. Dia.	G1	G2	G3	Gear Dry Weight
6H21/32P (1200x900)	CDH-660	3.75	240	2,360	2,260	2,460	965	900	750	6,390
8H21/32P (1600x900)	CDH-720	3.91	230	2,580	2,480	2,680	965	900	750	6,390
9H21/32P (1800x900)	CDH-800	4.50	200	2,850	2,750	2,950	965	900	750	6,390

Engine Type	Hub Dimension			Shaft Dimension			Prop.+ Hub Weight (kg)
	P2	P3	P4	D1	D2	D3	
6H21/32P (1200x900)	660	622	232	190	184	180	1,885
8H21/32P (1600x900)	720	681	253	212	206	200	2,447
9H21/32P (1800x900)	800	748	279	232	225	220	3,357

Marine Propulsion System



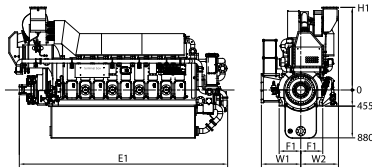
H25/33P | Bore: 250 mm, Stroke: 330 mm

Controllable Pitch Propeller

Permit high skew angles to minimize noise and vibration.

Fixed Pitch Propeller

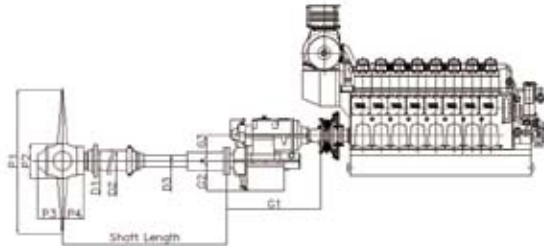
Guarantee optimum thrust, minimal noise and vibration level.



Dimensions

900 rpm	cyl.	Rated Output at Engine (kW)	Engine dimension (mm) & dry weight (ton)					
			E1	H1	F1	W1	W2	Dry Weight
	6	1,740 / 1,800	3,830	1,924	610	1,035	1,073	23.0
	8	2,320	4,590	2,331	610	1,035	1,073	26.9
	9	2,610	4,970	2,331	610	1,035	1,073	29.3

Specific Fuel Oil Consumption at 100 % Engine Load: 181 g/kWh (without pumps)



Engine Type	CPP Model	Gear ratio	rpm	Diameter Ø mm (P1)	Min. Dia.	Max. Dia.	G1	G2	G3	Gear Dry Weight
6H25/33P (1740x900, 1800x900)	CDH-800	4.29	210	2,850	2,750	2,950	965	900	750	6,390
8H25/33P (2320x900)	CDH-920	5.29	170	3,250	3,150	3,350	965	900	750	6,390
9H25/33P (2610x900)	CHD-940	5.29	170	3,360	3,260	3,460	965	900	750	6,390

Engine Type	Hub Dimension			Shaft Dimension			
	P2	P3	P4	D1	D2	D3	Prop.+ Hub Weight (kg)
6H25/33P (1800x900)	800	748	279	232	225	220	3,357
8H25/33P (2320x900)	920	860	320	265	258	250	5,105
9H25/33P (2610x900)	940	886	330	275	268	260	5,446

Marine Propulsion System



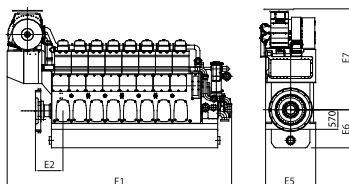
H32/40P | Bore: 320 mm, Stroke: 400 mm

Controllable Pitch Propeller

Permit high skew angles to minimize noise and vibration.

Fixed Pitch Propeller

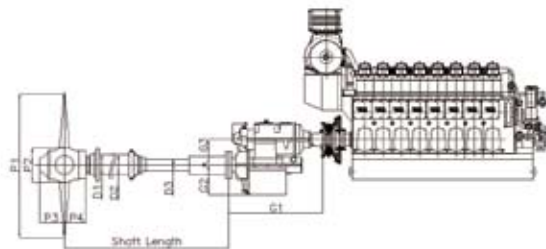
Guarantee optimum thrust, minimal noise and vibration level.



Dimensions

750 rpm	cyl.	Rated Output at Engine (kW)	Engine dimension (mm) & dry weight (ton)				
			E1	E2	E5	E6	Dry Weight
	6	3,000	5,515	800	1,460	1,110	3,295
	8	4,000	6,545	800	1,460	1,110	3,495
	9	4,500	7,085	800	1,460	1,110	3,495

Specific Fuel Oil Consumption at 100 % Engine Load: 182 g/kWh (without pumps)



Engine Type	CPP Model	Gear ratio	rpm	Diameter Ø mm (P1)	Min. Dia.	Max. Dia.	G1	G2	G3	Gear Dry Weight
6H32/40P (3000x750)	CDH-1050	5.00	150	3,700	3,600	3,800	1,085	1,000	850	9,010
8H32/40P (4000x750)	CDH-1150	5.56	135	4,150	4,050	4,250	1,120	1,120	950	12,440
9H32/40P (4500x750)	CDH-1250	6.25	120	4,550	4,450	4,650	1,120	1,120	950	12,440

Engine Type	Hub Dimension			Shaft Dimension			
	P2	P3	P4	D1	D2	D3	Prop.+ Hub Weight (kg)
POWER (kWxrpm)							
6H32/40P (3000x750)	1,050	971	361	305	293	285	7,590
8H32/40P (4000x750)	1,150	1,096	407	345	334	325	9,971
9H32/40P (4500x750)	1,250	1,191	443	375	361	350	12,804

CPP Propulsion System

CPP Products and Typical Application

Hub Assembly

- Propeller
- Hub & Linkage
- Servo Cylinder

Shaft Assembly

- Hollow Shafts
 - Pitch Control Rod
 - Shaft Coupling
 - L.O. Unit
- *L.O. (Lubrication Oil)

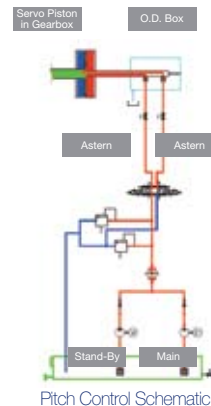
Gearbox Assembly

- Gears
- Pitch Control Unit
- Servo Cylinder

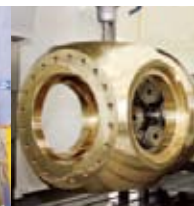


Hub Design Feature

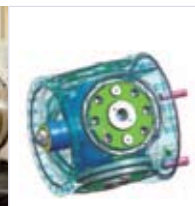
- Hub
 - » Design : FEM & Rigid Design
 - » Material : NiAl Bronze
- Rigid Crank & Sliding Block Mechanism
- Proven Pitch Control Technology
 - » Hydraulically Operated Pitch Control with Servo Cylinder (O.D Box)
- Shaft Mounted O.D. Box (Over 4,500 kW)
- Gear Box Front Mounted O.D. Box (Less Than 4,500 kW)
 - » Perfect Sealing Reliability
 - » Sealing Method :
- Quad Ring : Between Hub and Blade & Oil Pressure
 - » Hub : 5 (bar) / 30min
- Turcon Glyd Ring : Between Cylinder and Piston
 - » O.D Box : 90 (bar) / 30min



Pitch Control Test



Precision Machining of Hub Body



CPP Hub Mechanism

Marine Gearbox



Gearbox Specifications

HiMSEN CPP-FPP

typical vessel	HiMSEN engine	power	input speed	output speed	gear ratio	PTO		PTO speed	gear ratio		
cargo vessel (DWT)	type	(kW)	n1 (rpm)	n2 (rpm)	i	P1/n1	P1/n2	P2 (kW)	n3 (60 Hz)	i	P2/n3 P2/n1
1000	6H 21 / 32 P	1,200	900	240	3.75	1.33	5.00	--	--	--	--
2000	8H 21 / 32 P	1,600	900	230	3.91	1.78	6.96	--	--	--	--
3000	9H 21 / 32 P	1,800	900	200	4.50	2.00	9.00	--	--	--	--
3000	6H 25 / 33 P	1,800	900	210	4.29	2.00	8.57	500	1,500	0.60	0.33 0.56
5000	8H 25 / 33 P	2,320	900	170	5.29	2.58	13.65	500	1,500	0.60	0.33 0.56
6000	9H 25 / 33 P	2,610	900	170	5.29	2.90	15.35	500	1,500	0.60	0.33 0.56
8000	6H 32 / 40 P	3,000	750	150	5.00	4.00	20.00	800	1,500	0.50	0.53 1.07
12000	8H 32 / 40 P	4,000	750	135	5.56	5.33	29.63	800	1,500	0.50	0.53 1.07
16000	9H 32 / 40 P	4,500	750	120	6.25	6.00	37.50	800	1,500	0.50	0.53 1.07
20000	12H 32 / 40 P	6,000	750	125	6.00	8.00	48.00	--	--	--	--
25000	16H 32 / 40 P	8,000	750	115	6.52	10.67	69.57	--	--	--	--
30000	18H 32 / 40 P	9,000	750	115	6.52	12.00	78.26	--	--	--	--



Hyundai Marine Gearbox for CP & FP Propellers

HiMSEN CPP-FPP

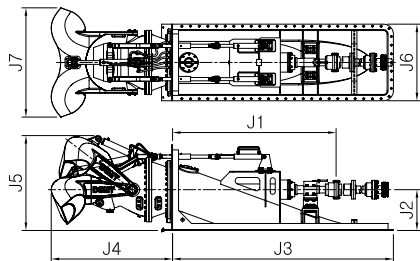
			single- reduction gears	reverse- reduction gears	PTO	primary PTO	primary PTO	fixation for HIMSEN engine	max. engine speed	primary PTO	propeller thrust ahead
bearing	P1 /n1	i	type PWC acc. curve	type PRVC acc. curve	P2 /n1	selection PWC	selection PRVC	single- and reverse reduction gears i= 4,0 , 6,0	n1 (rpm)	"PWC PRVC"	(kN)
roller	1.33	3.75	425 A	475 A	--	--	--	530B	1,200	--	155
	1.78	3.91	475 A	475 A	--	--	--	530B	1,200	--	155
	2.00	4.50	530 A	530 A	--	--	--	530B	1,200	--	155
	2.00	4.29	530 A	530 A	0.56	A= 390	A=390	530 B	1,200	A= 315	155
	2.58	5.29	670 B	670 B	0.56	A= 390	A=390	670B	1,000	A= 390	310
	2.90	5.29	750 B	750 B	0.56	A= 430	A=430	750B	900	A= 430	410
	4.00	5.00	850 B	850 B	1.07	A= 480	A=480	850B	750	A= 480	510
	5.33	5.56	950 B	950 B	1.07	A= 480	A=480	950B	750	A= 520	720
6.00	6.25	950 B	950 B	1.07	A= 480	A=480	950B	750	A= 520	720	
plain	8.00	6.00	see catalogue PGV/PGVC	X	--	--	--		--	--	--
	10.67	6.52		X	--	--	--		--	--	--
	12.00	6.52		X	--	--	--		--	--	--

HiMSEN Water-Jet Propulsion System

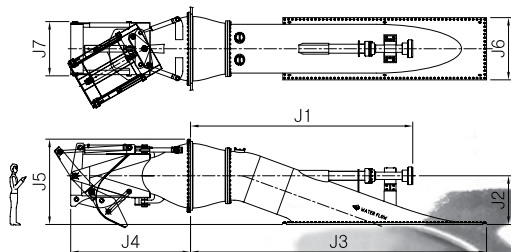
Engine & Machinery Division / Marine Engine & Machinery

Water-Jet Propulsion System

16



Water-Jet Model : DSJ100 ~ DSJ300



Water-Jet Model : DSJ400 ~ DSJ900

Water-Jet Propulsion System

Dimension

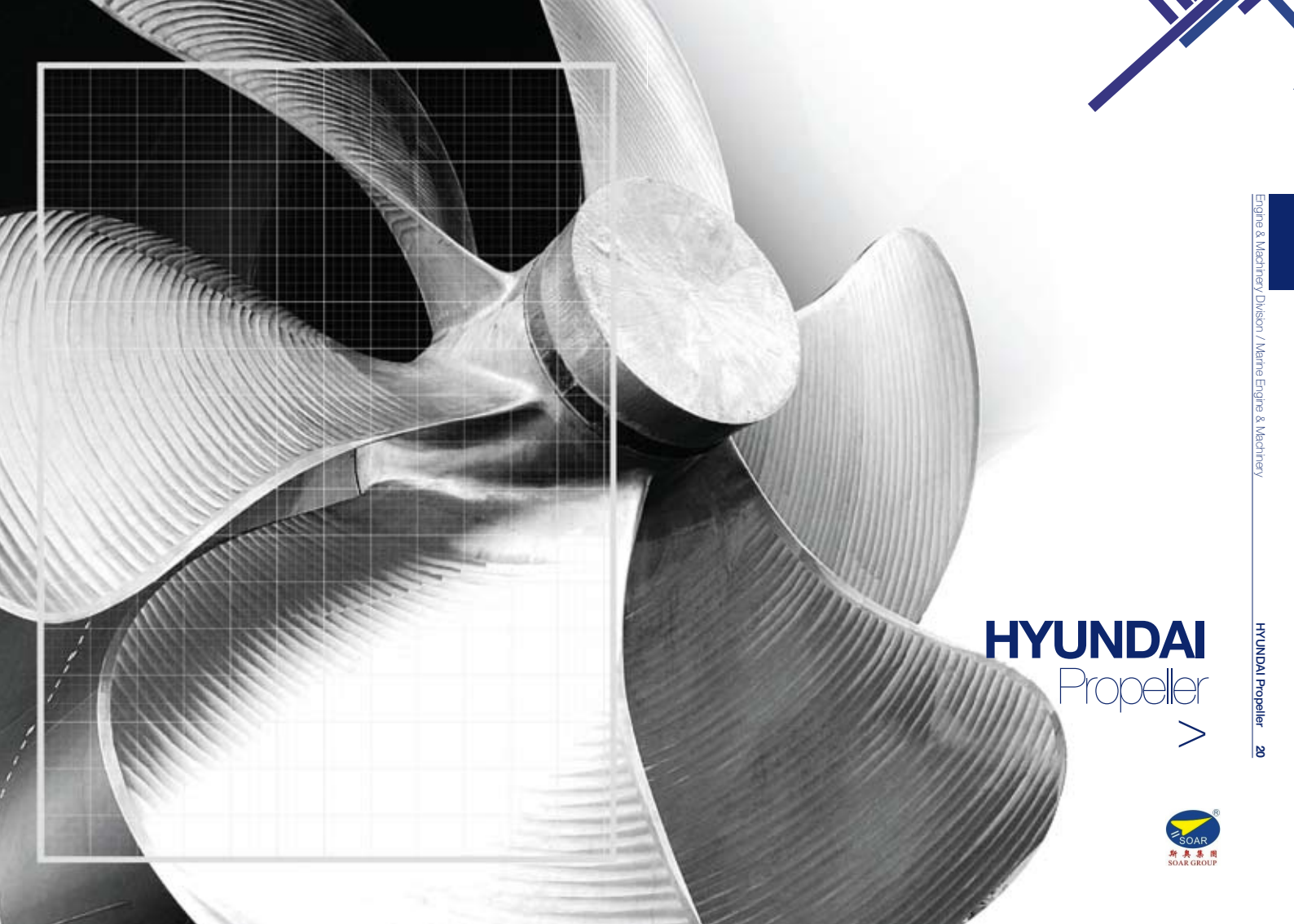
Engine type		WATER-JET Model / Major Dimension							
POWER (kW x rpm)	Water Jet Model	J1	J2	J3	J4	J5	J6	J7	Water Jet Dry Weight
20H17/21V (2800x1500) (3200x1800)	DSJ200	2,433	613	3,330	1,947	1,403	1,150	1,635	1,895
	DSJ300	2,417	607	3,250	2,161	1,062	882	770	2,670
16H17/21V (2240x1500) (2560x1800)	DSJ200	2,433	613	3,330	1,947	1,403	1,150	1,635	1,895
	DSJ300	2,417	607	3,250	2,161	1,062	882	770	2,670
18H17/21V (2520x1500) (2880x1800)	DSJ300	2,417	607	3,250	2,161	1,062	882	770	2,670
	DSJ400	3,263	819	4,388	2,917	1,434	1,110	1,040	3,380
20H17/21V (2800x1500) (3200x1800)	DSJ300	2,417	607	3,250	2,161	1,062	882	770	2,670
	DSJ400	3,263	819	4,388	2,917	1,434	1,110	1,040	3,380

Dimension explanation

J1 – from the Transom face ~ to the Water-jet shaft end
 J2 – from the Bottom ~ to the Water-jet shaft centerline
 J3 – from the Transom face ~ to the Inlet-duct end (Hull inside)
 J4 – from the Transom face ~ to the bucket end (outside extrusion)
 J5 – from the Bottom ~ to the top
 J6 – Bottom interface width
 J7 – bucket width



Engine type		WATER-JET Model / Major Dimension							
POWER (kW x rpm)	Water Jet Model	J1	J2	J3	J4	J5	J6	J7	Water Jet Dry Weight
6H21/32P (1200x900)	DSJ100	2,249	522	2,867	1,579	1,143	905	1,287	1,310
	DSJ200	2,433	613	3,330	1,947	1,403	1,150	1,635	1,895
8H21/32P (1600x900)	DSJ100	2,249	522	2,867	1,579	1,143	905	1,287	1,310
	DSJ200	2,433	613	3,330	1,947	1,403	1,150	1,635	1,895
9H21/32P (1800x900)	DSJ100	2,249	522	2,867	1,579	1,143	905	1,287	1,310
	DSJ200	2,433	613	3,330	1,947	1,403	1,150	1,635	1,895
6H25/33P (1800x900)	DSJ200	2,433	613	3,330	1,947	1,403	1,150	1,635	1,895
	DSJ300	2,417	607	3,250	2,161	1,062	882	770	2,670
8H25/33P (2320x900)	DSJ300	2,417	607	3,250	2,161	1,062	882	770	2,670
	DSJ400	3,263	819	4,388	2,917	1,434	1,110	1,040	3,380
9H25/33P (2610x900)	DSJ300	2,417	607	3,250	2,161	1,062	882	770	2,670
	DSJ400	3,263	819	4,388	2,917	1,434	1,110	1,040	3,380
6H32/40P (3000x750)	DSJ300	2,417	607	3,250	2,161	1,062	882	770	2,670
	DSJ400	3,263	819	4,388	2,917	1,434	1,110	1,040	3,380
8H32/40P (4000x750)	DSJ300	2,417	607	3,250	2,161	1,062	882	770	2,670
	DSJ400	3,263	819	4,388	2,917	1,434	1,110	1,040	3,380
9H32/40P (4500x750)	DSJ400	3,263	819	4,388	2,917	1,434	1,110	1,040	3,380
	DSJ700	4,160	1,080	5,730	3,820	1,830	1,400	1,230	6,840
12H32/40P (6000x750)	DSJ400	3,263	819	4,388	2,917	1,434	1,110	1,040	3,380
	DSJ700	4,160	1,080	5,730	3,820	1,830	1,400	1,230	6,840
16H32/40P (8000x750)	DSJ700	4,160	1,080	5,730	3,820	1,830	1,400	1,230	6,840
	DSJ900	5,055	1,328	7,069	4,716	2,218	1,700	1,414	10,480
18H32/40P (9000x750)	DSJ700	4,160	1,080	5,730	3,820	1,830	1,400	1,230	6,840
	DSJ900	5,055	1,328	7,069	4,716	2,218	1,700	1,414	10,480



HYUNDAI Propeller



新奥集团
SOAR GROUP

HYUNDAI PROPELLER

Propeller shop

HIH produces a wide variety of marine propellers. Our propellers have a diameter up to 11,000 mm, with maximum unit weight of 114,000 kg, and are typically made of manganese bronze and nickel-aluminum bronze.

We employ a comprehensively computerized design, manufacturing, and inspection system for these products.

Production Capacity

Max. | 114 ton in Weight, 11 m in Diameter

Min. | 10 ton in Weight, 3 m in Diameter



World's Largest Propeller

Weight 111.2 ton

Diameter 9 m

Blade 6

Shiptype 8,600TEU Container

Shaft Propeller Shaft / Intermediate

Shaft Rudder Stock Straight Type



Production Capacity

Max. | 120 ton in Weight

| 2,200 mm in Diameter

| 18,000 mm in Length

Min. | 300 mm in Diameter

| 2,000 mm in Length



Side Thruster



CP & FP Propeller

HYUNDAI Thruster



Product Range HSC / HSF Series

Type	Model Specification		Applications
	Propeller O.D	Motor Output	
HSC (CPP)	1,000 mm ~	300 kW ~	Container Carrier
	3,400 mm	4,000 kW	
HSF (FPP)	1,000 mm ~	300 kW ~	Product Carrier
	2,000 mm	1,200 kW	

Features

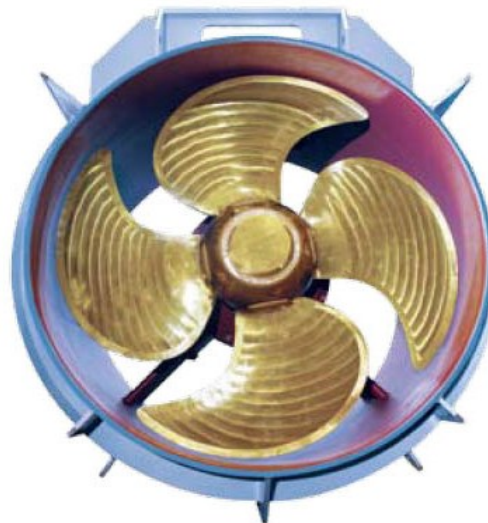
HYUNDAI thruster can be fitted to a wide range of vessels operating in all over the world. The tunnel thruster is designed for generating thrust force efficiently to the ship in maneuvering condition.

Thruster system normally consists of the thruster unit with tunnel, hydraulic equipment, remote controller and prime mover.

Long service life and easy maintenance are key factors in the design and structure of HYUNDAI thruster.

Advantages

- Compact Design
- Powerful Thrust Force
- Low Noise, Low Vibration
- Well-balanced Performance (port / starboard)
- Superior Quality
- Easy Installation
- Easy Operation
- Easy Maintenance
- Reliable System Interface Control
- Rapid Technical Service
- Quality-oriented Feedback Activity



System Configuration

HYUNDAI thruster system consists of the thruster unit with tunnel, hydraulic equipment for pitch control, gravity tank, remote controller, feedback device, and electrical driver with starter. Operating the pitch control dial mounted on the remote controller in the wheel house or wing sides actuates the solenoid valve inside the Hyd. pump unit, then pressurized oil move the cross head (piston) directly. Actuating force of the piston is converted into torque by sliding shoe mechanism, changing the pitch angle of the propeller blades accordingly. The stroke of the propeller is transmitted from the cross head to the angle transmitter via linkage. The angle transmitter converts mechanical stroke into electrical feedback signal displayed on the control board.



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