

# Niigata Marine

## Selection Guide

IHI Power Systems Co., Ltd.



*Marine Products*

## More than century of experience leads to innovative power

NIIGATA is the core brand of IHI Power Systems Co., Ltd., the only manufacturer in the world with both engines and azimuth Z-Pellers that is of our own, original design without integrating or merging with other brands.

With more than 100 years' history, NIIGATA is proud of its reliability and reputation among harbour and terminal tug and OSV operators across the world. The Japan-headquartered company manufactures engines producing a total of around 1m horsepower a year and nearly 5,000 units of Z-Pellers have been delivered around the world. As an all-round power system provider, it is also involved in diesel engines, gas engines, and gas turbines co-generation activity.



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# 28AHX-DF

## Ship Propulsion Dual Fuel Engine

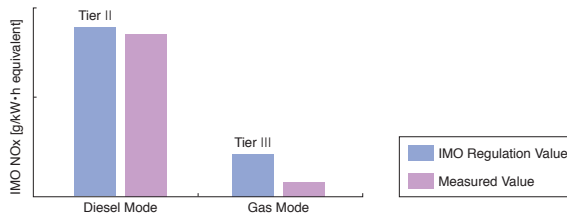
Natural gas burns far cleaner than petroleum fuel, to there is growing interest in the ship field.

We successfully delivered the world's first 4 stroke Dual Fuel engine for Fixed Pitch Propeller directly couple driven LNG fueled harbor tug boat. It offers high dynamic performance of load following capacity in gas mode, equivalent in diesel mode for tug operation, and safe redundancy as instantly switch between gas & diesel mode.



### Environmental Performance Meets IMO Tier III NOx Regulations

The 28AHX-DF is an environmentally friendly engine, satisfying IMO Tier III NOx regulations. It uses clean gas combustion, making it possible to meet the new regulations without the need for an exhaust gas processing reactor.



\*Nitrogen oxide (NOx) emissions

\*IMO Tier III NOx regulations : New exhaust gas regulations by the International Maritime Organization (IMO), to be applied from 2016.

Model	Max. Continuous Rating		Engine Speed	Cyl. Bore	Piston Stroke	Approx. Dry Mass
	kWm	PS				t
6L28AHX-DF	1920	2610	800	280	390	22
8L28AHX-DF	2560	3480	800	280	390	28
9L28AHX-DF	2880	3915	800	280	390	31

Model	Dimension (mm)							
	L <sub>1</sub>	L <sub>2</sub>	W <sub>1</sub>	W <sub>2</sub>	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>4</sub>
6L28AHX-DF	5049	5099	1955	1200	2240	445	3315	2040
8L28AHX-DF	5920	5970	1956	1200	2370	445	3445	2040
9L28AHX-DF	6370	6420	2051	1200	2370	445	3445	2040

[Note] \* See dimensional drawing in P.11.

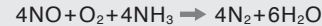
## SCR(Selective Catalytic Reduction System)

### Principle of the SCR system (Reduction reaction by Urea)

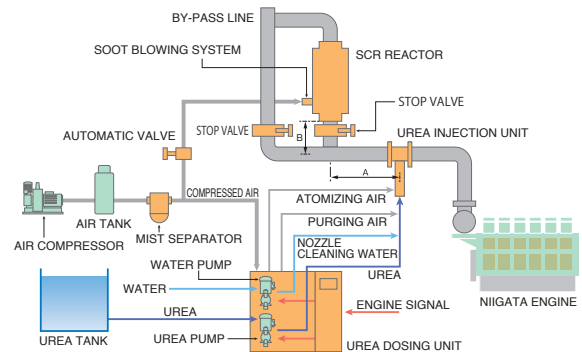
- Urea is injected by the Urea injection device. The Urea is decomposed into ammonia and carbon dioxide by the heat from exhaust gas.



- Generated ammonia, nitrogen oxides and oxygen are decomposed into nitrogen and water by the catalyst in the reactor.



### Composition of the SCR system



#### COMPONENTS OF SCR SYSTEM

[Note 1] Please plan for the straight length of the exhaust pipe from Urea injection unit (A) to be 2000mm or more and total length from Urea injection unit to reactor inlet (A+B) to be 3000mm or more.

[Note 2] Please contact NIIGATA if the above exhaust pipe length requirements cannot be met.

### Dimension table of Examples of standard SCR reactors

Engine Model	Engine Output kWm	Dimensions of Reactor (mm)			Mass of Reactor t
		L	W	H	
6MG25HX	1323	967	967	3500	1.8
6MG28HX	1838	1909	967	3550	2.6
6MG28AHX	2220	1438	967	3800	2.5
8MG28AHX	2960	1438	1438	3900	3.2
9MG28AHX	3330	1438	1438	3900	3.2

[Note] \* This system can reduce NOx emissions by 80%.

[Note] \* This table is for MDO use. Please contact NIIGATA if using HFO.

## Hybrid Tug System

Tugboats are small work boats that assist in bringing large ships to shore, mostly in harbors, and they are deployed in large numbers at ports throughout the world.

These ports, where large numbers of these ships are gathered, are located near areas of human activity, and so many concerns over reducing their environmental impact have emerged.

For many years, NIIGATA has been providing marine engines,

Z-Pellers and control systems as tugboat propulsion systems. We're now pushing ahead with the development of the "NIIGATA Hybrid System", as a new type of system that is friendly to the environment.



## Advantages of the Hybrid System

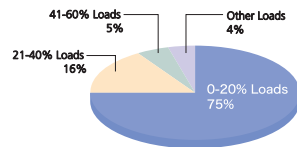
Tugboats, which are designed to produce maximum output during operation, experience fluctuations in their engine-load factor while being piloted.

The reason is that they are run at low output while traveling from one place to another or while returning to port.

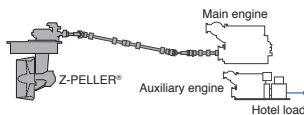
On the other hand, the efficiency of diesel engines drops when load is low, and thus fuel consumption tends to worsen.

Hybrid tugboats use a

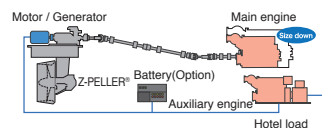
propulsion system that combines conventional shaft drives with the driving force of the electric motor, so that optimal performance in various types of operations is achieved. Through this arrangement, fuel consumption is drastically reduced.



### Conventional



### Hybrid



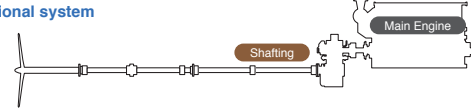
## Diesel Driven System

All engines meet NOx emission limit specified by IMO Tier II.

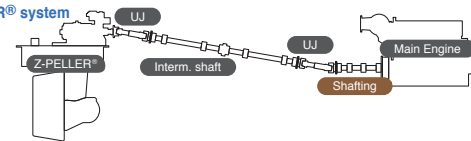
These systems are applied

for any kind of vessel's requirements by customers, especially Tug boats and Offshore support vessels.

### Conventional system



### Z-PELLER® system



## Diesel Electric System

Modern power package integrated propulsion system shall take account of efficiency at saving energy which equal meaning for environmental control eventually.

Diesel Electric driven

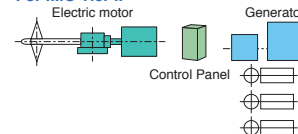
system is really one of solution as the symbol for future aspects of modernized power package. Motor driven application is available to be given satisfaction at any operator.

## Electric Propulsion System

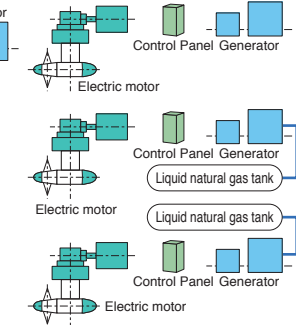
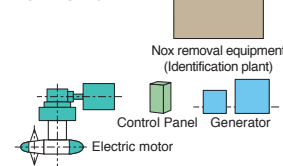
The electric propulsion system is a technology that improves energy efficiency

throughout the high value Multi Purpose OSV.

### For IMO Tier II



### For IMO Tier III

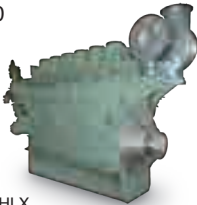


[Note] \* Conventional arrangement applies the same system.

# Product Lineup

## Medium Speed Diesel Engine

► P10



6MG26HLX



6MG28AHX



8MG28HX



12MG28AHX

## Low Speed Diesel Engine

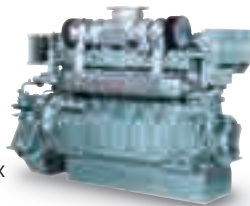
► P16



6M31NT

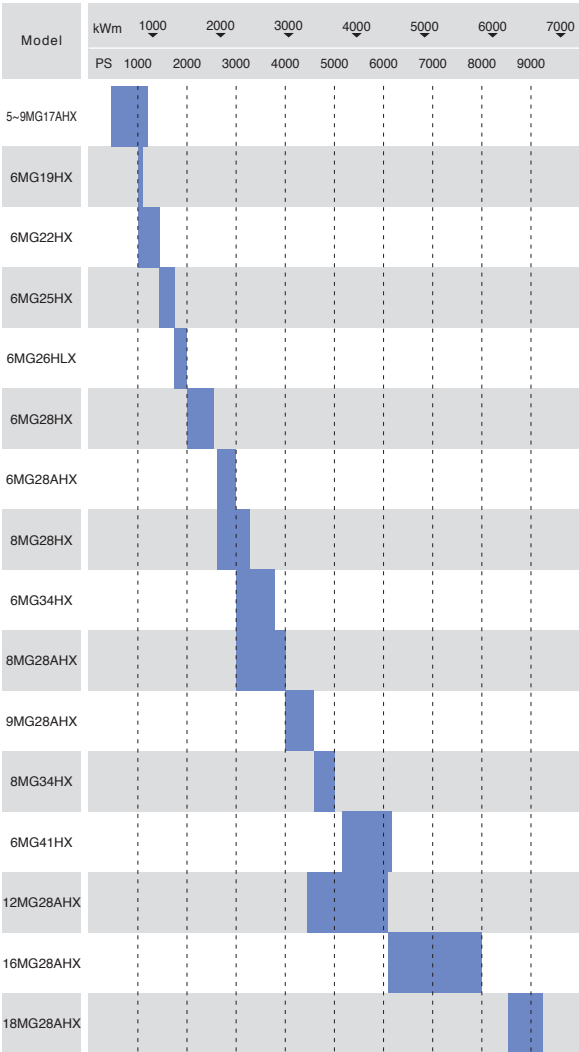
## High Speed Diesel Engine

► P18



6MG17HX

## Medium Speed Diesel Engine Power Range

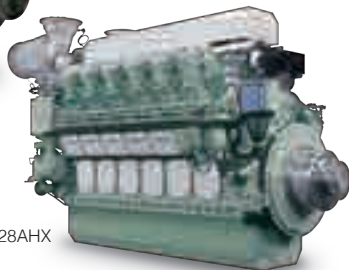


# AHX Series

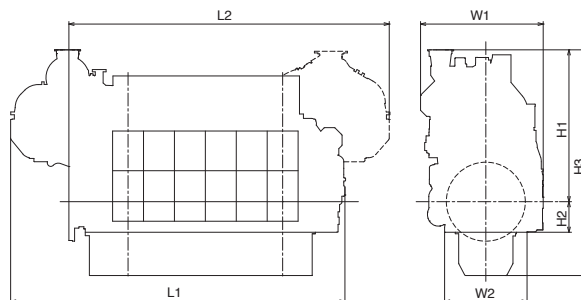
## Medium Speed Diesel Engine



6MG28AHX



12MG28AHX



### 28AHX Specifications

Model	Max. Continuous Rating		Engine Speed	Cyl. Bore	Piston Stroke		Approx. Dry Mass
	kWm	PS	min <sup>-1</sup>		mm	mm	
6MG28AHX	2220	3018	800	280	390	20	
8MG28AHX	2960	4024	800	280	390	26	
9MG28AHX	3330	4527	800	280	390	28	
12MG28AHX	4440	6036	800	280	390	36	
16MG28AHX	5920	8048	800	280	390	45	
18MG28AHX	6660	9055	800	280	390	50	

Model	Dimension (mm)							
	L <sub>1</sub>	L <sub>2</sub>	W <sub>1</sub>	W <sub>2</sub>	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>4</sub>
6MG28AHX	4870	4650	1750	1200	2200	445	3275	2040
8MG28AHX	5770	5550	1850	1200	2330	445	3405	2040
9MG28AHX	6220	6000	1850	1200	2330	445	3405	2040
12MG28AHX	—	5260	2200	1450	2425	445	3370	1910
16MG28AHX	—	6450	2300	1450	2580	445	3525	1910
18MG28AHX	—	7100	2350	1450	2780	445	3725	1910

### 17AHX Specifications

Model	Propulsion						Approx. Dry Mass t
	900min <sup>-1</sup>		1000min <sup>-1</sup>		1200min <sup>-1</sup>		
	kWm	PS	kWm	PS	kWm	PS	
5MG17AHX	500	680	525	714	625	850	6.8
6MG17AHX	600	816	630	857	750	1020	8.1
7MG17AHX	700	952	735	1000	875	1190	9.4
8MG17AHX	800	1088	840	1142	1000	1360	10.7
9MG17AHX	900	1224	945	1285	1125	1530	11.9

Model	Dimension (mm)							
	L <sub>1</sub>	L <sub>2</sub>	W <sub>1</sub>	W <sub>2</sub>	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>4</sub>
5MG17AHX	2950	3570	1510	780	1575	310	2305	1435
6MG17AHX	3235	3855	1510	780	1670	310	2400	1435
7MG17AHX	3520	4140	1510	780	1670	310	2400	1435
8MG17AHX	3805	4425	1510	780	1670	310	2400	1435
9MG17AHX	4090	4710	1510	780	1755	310	2485	1435

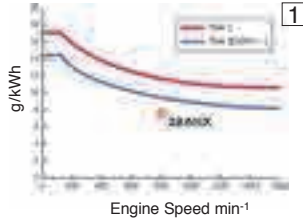
Note

\* Maximum Continuous Rating shows the figure at crankshaft end and as per one engine power.  
\* Maximum Continuous Rating is applied for Marine Diesel Oil (A oil, ISO8217) or Gas Oil.  
\* Due to continuous development, some data may change.



### 1 High efficiency and low emissions

By employing the Miller cycle system and VIVT (Variable Intake Valve Timing) technology, 28AHX series has realized the best performance and low fuel consumption. 28AHX engine complies fully with IMO NOx regulation Tier II.



### 2 Easy maintenance and Low operating cost

The Cylinder unit design that integrates the piston, cylinder liner and cylinder head helps reduce the amount of

maintenance work and cost, makes it easier to remove these parts from the crankcase.

### 3 Gauge board "Grafico"

The latest electrical type gauge board "Grafico" is installed on 28AHX engine. Displays engine status, engine speed, pressure and temperature, digitally and as bar graphs using LEDs, for

excellent visibility and rapid assessment to safe engine operations. Interface includes industry-standard signaling system to ensure compatibility with external systems.

### 4 Front-end unit (Optional)

Auxiliary equipment, including the lubricating oil system, fuel system, and cooling water system, are

integrated into a single unit located at the front end of the engine.

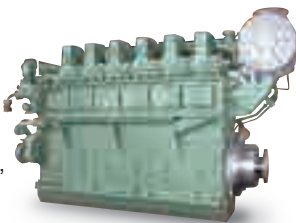


# HX Series

## Medium Speed Diesel Engine

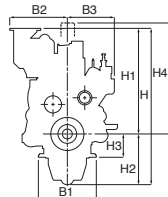
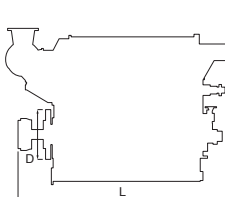
### Best seller of NIIGATA engines

Completed series "HX engines"  
design with modernized concept,  
4 cycle, 4 stroke, hanger type,  
medium speed engines.



6MG28HX

### Specifications



Model	Max.Continuous Rating		Engine Speed min <sup>-1</sup>	Cyl. Bore mm	Piston Stroke mm	Approx. Dry Mass t
	kWm	PS				
6MG19HX	761	1035	1000	190	260	7.0
6MG22HX	1062	1445	1000	220	280	9.1
6MG25HX	1368	1860	750	250	350	13.0
6MG26HLX	1518	2065	750	260	350	13.5
6MG28HX	1897	2580	750	280	370	16.0
8MG28HX	2427	3300	750	280	370	21.5
6MG34HX	3033	4125	620	340	450	33.6
8MG34HX	3640	4950	600	340	450	43.5
6MG41HX	4552	6190	520	410	560	64.0

Model	Dimension (mm)								
	L	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>4</sub>	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>
6MG19HX	2912	2122	1472	650	320	1550	800	809	666
6MG22HX	3027	2389	1729	660	330	1690	890	865	688
6MG25HX	3408	2886	2166	720	380	2080	1040	992	758
6MG26HLX	3463	2921	2201	720	380	2080	1040	1030	765
6MG28HX	3704	3142	2260	882	400	2210	1130	1001	823
8MG28HX	4638	3319	2485	834	400	2210	1130	1001	823
6MG34HX	4530	3573	2580	993	515	2760	1390	916	1028
8MG34HX	5590	3573	2580	993	515	2760	1390	916	1178
6MG41HX	6890	3875	2875	1000	650	3030	1796	1225	1848

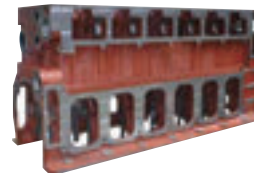
Note: \* Maximum Continuous Rating shows the figure at crankshaft end and as per one engine power.  
 \* Maximum Continuous Rating is applied for Marine Diesel Oil (A oil, ISO8217) or Gas Oil.  
 \* Due to continuous development, some data may change.

### Feature of HX Series

#### Cylinder Block

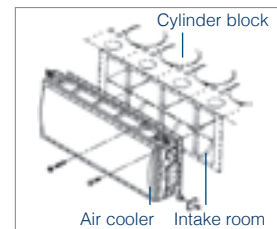
Highly rigid monoblock  
double walled hanger type  
cylinder block. Simple and  
compact design of cylinder  
block is realized as  
lubrication pipe and cooling  
water pipe being molded  
into cylinder block and the  
air cooler is directly fitted

on the cylinder block so  
that outside piping and duct  
are minimized.



#### Air Cooler

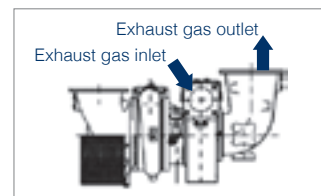
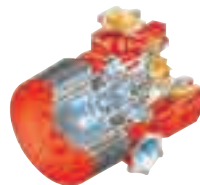
Air cooler is installed directly  
to the intake room on the  
side of the cylinder block.  
As a result, connecting duct,  
bracket and fittings are  
eliminated and the structure  
is simplified.



#### Exhaust Turbocharger

High performance non  
cooling type turbocharger  
made by ABB company  
TPS is adopted.

The performance  
improvement is aimed at the  
same time as increasing  
corrosion resistance.

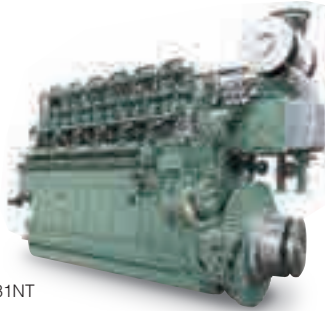




# Low Speed Diesel Engine

## Durability with Japanese 4 stroke Low Speed Engine

To meet the long time customer's expectations, NIIGATA has continually developed and manufactured the 4 stroke low speed diesel engines and the total propulsion systems for in-land general cargo and ocean fishery vessel.

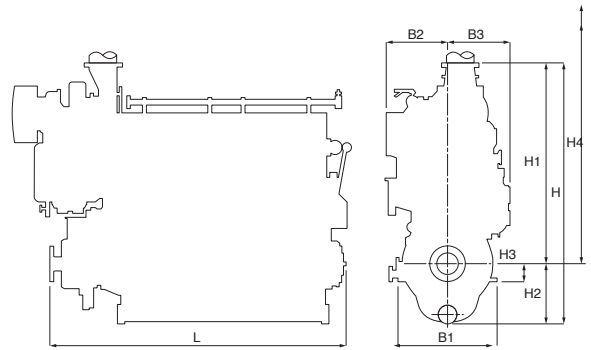


6M31NT

### Low Speed Diesel Engine Power Range

Model	kWm	1000		2000		3000	
	PS	1000	2000	3000	4000		
6M26ATE							
6M28BT							
6M28NT							
6M31BT							
6M31NT							
6M34RT							
6M34BT							
6M34NT							

### Specifications



Model	Max. Continuous Rating		Engine Speed	Cyl. Bore	Piston Stroke	Approx. Dry Mass
	kWm	PS	min <sup>-1</sup>	mm	mm	t
6M26ATE	912	1240	400	260	460	13.7
6M28BT	1062	1445	390	280	480	16.2
6M28NT	1214	1650	390	280	480	16.2
6M31BT	1368	1860	360	310	530	21.3
6M31NT	1353	1840	290	310	600	25.2
6M34RT	1471	2000	280	340	630	31.0
6M34BT	1669	2270	310	340	620	28.5
6M34NT	1897	2580	310	340	620	28.7

Model	Dimension (mm)							
	L	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>4</sub>	B <sub>1</sub>	B <sub>3</sub>
6M26ATE	3204	2945	2240	705	210	2317	1220	904
6M28BT	3760	3075	2330	745	230	2512	1270	910
6M28NT	3760	3075	2330	745	230	2512	1270	910
6M31BT	4139	3550	2715	835	250	2773	1300	1061
6M31NT	4491	3714	2984	730	250	3220	1450	1194
6M34RT	4684	3646	2835	811	315	3360	1420	1112
6M34BT	4701	3520	2745	775	315	3100	1440	1141
6M34NT	4731	3625	2850	775	315	3100	1440	1031

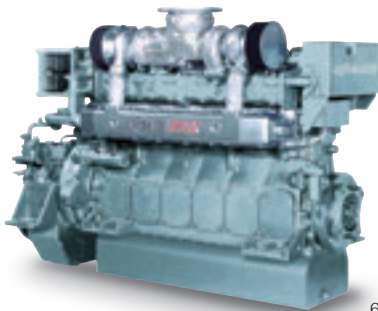
Note

- \* Maximum Continuous Rating shows the figure at crankshaft end and as per one engine power.
- \* Maximum Continuous Rating is applied for Marine Diesel Oil (A oil, ISO8217) or Gas Oil.
- \* Due to continuous development, some data may change.

# High Speed Diesel Engine

## Compact and Reliability

Brand new design concept with the latest mechanically controlled technology for emission guard, 4 cycle, 4 stroke, hanger type, reliable high speed diesel engines.



6MG17HX

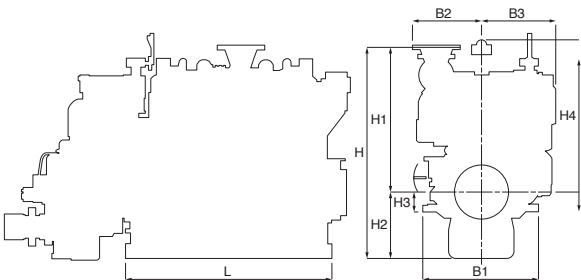
### High Speed Diesel Engine Power Range

Model	kWm	1000		2000		3000		4000	
	PS	1000	2000	3000	4000	5000	6000		
6NSD-M									
6NSDL-M									
6MG17HX									
16V20FX									

Note

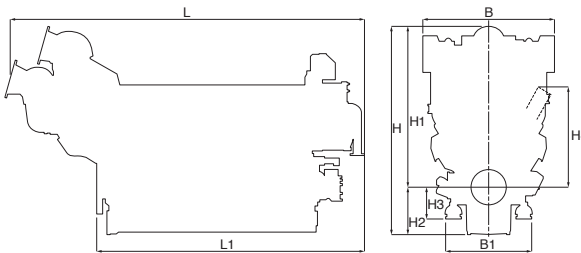
- \* Maximum Continuous Rating shows the figure at crankshaft end and as per one engine power.
- \* Maximum Continuous Rating is applied for Marine Diesel Oil (A oil, ISO8217) or Gas Oil.
- \* Due to continuous development, some data may change.

### Specifications



Model	Max. Continuous Rating		Engine Speed	Cyl. Bore	Piston Stroke	Approx. Dry Mass
	kWm	PS	min <sup>-1</sup>	mm	mm	t
6NSD-M	496	675	1450	160	210	2.9
6NSDL-M	570	775	1400	160	235	3.4
6MG17HX	761	1035	1650	165	215	3.2

Model	Dimension (mm)									
	L	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>4</sub>	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	
6NSD-M	1929	1592.5	1088	504.5	200	1210	798	537	551	
6NSDL-M	1872	1682.5	1153	529.5	225	1330	828	537	561	
6MG17HX	1975	1722	1178	544	160	1240	930	562	600	



Model	Max. Continuous Rating		Engine Speed	Cyl. Bore	Piston Stroke	Approx. Dry Mass
	kWm	PS	min <sup>-1</sup>	mm	mm	t
16V20FX	4000	5440	1650	205	220	13.8

Model	Dimension (mm)									
	L	L <sub>1</sub>	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>4</sub>	B	B <sub>1</sub>	
16V20FX	4861	3663	2826	2176	650	435	1170	1782	1150	

# Z-PELLER® Propulsion System

Z-PELLER® embodies  
the essence of NIIGATA technology  
and experience

Total solution is secured under complete NIIGATA's technology for providing Single Responsibility on the propulsion package. NIIGATA has its own positive design logic for producing prime movers as the best match with Z-PELLER® propulsion unit for achieving high level performance. It is most effective advantage which NIIGATA is in a position to provide solo NIIGATA's brand integrated propulsion package.



## Application of Z-PELLER®

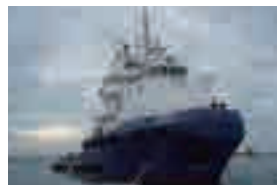
Multi application along with  
high class efficient propeller

Z-PELLER® assures high grade performance and supports the operation of various kinds of vessels, for which sailing, handling, steering with excellent maneuverability to be realized.

Tug boats



Offshore vessels



Passenger vessels



Special vessels



# Single Responsibility

## Technology configurative one brand propulsion package

Single propulsion package of NIIGATA brand includes integrated control system supports unconditional security at variety ship operational fields. Friendly maintenance philosophy with robust structure is considered at the design of Z-PELLER®. Main machineries consisting propulsion package are developed principally how to make sure high level performance of driving Z-PELLER®.



Z-PELLER®



Shafting



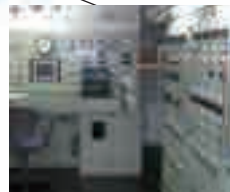
Flexible Coupling



Main Engine



Control Device



Monitor Device



## Specifications of Z-PELLER® Propulsion Packages

### Z-PELLER® FPP Series

Model	Max. Cont. Input		Input Speed min <sup>-1</sup>	Prop. Dia. mm	Bollard Pull		Mass t
	kWm	PS			100%	110%	
ZP-09	735	1000	1000-1650	1600	26	28	9.5
ZP-10	956	1300	1000	1750	32	34	12.5
ZP-11A	1176	1600	750-1800	1900	40	43	15
ZP-21	1323	1800	750-1800	2000	45	48	15.5
ZP-31	1654	2250	750-1800	2300	56	60	20
ZP-31B	1654	2250	750	2300	60	64	21.1
ZP-41A	1838	2500	750	2600	65	69	25
ZP-41	2427	3300	750-1800	2700	85	90	31
ZP-41B	2574	3500	750	2800	90	95	36.5
ZP-41B	2942	4000	800	3100	100	105	43

### Z-PELLER® CPP Series

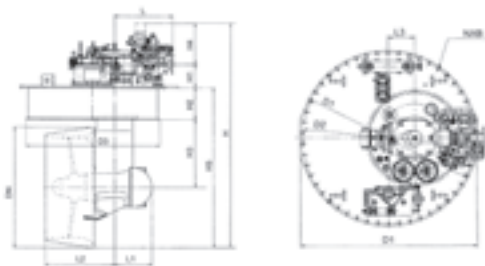
Model	Max. Cont. Input		Input Speed min <sup>-1</sup>	Prop. Dia. mm	Bollard Pull		Mass t
	kWm	PS			100%	110%	
ZP-31CP	1618	2200	750	2300	53	56	25
ZP-41CP	2206	3000	750-800	2700	75	80	36.5
ZP-52CP	3310	4500	800	3200	110	115	54

### Z-PELLER® FPP Series

Model	Dimension (mm)															
	L	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>4</sub>	H <sub>5</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	DN	N x B	
ZP-09	835	700	1110	325	3805	500	560	1130	636	2669	2500	2420	2220	1957	36x35	
ZP-10	1170	690	1215	275	4370	569	610	1212	910	2891	2700	2610	2380	2138	36x35	
ZP-11A	1170	720	1385	450	4496	569	645	1400	725	3202	3000	2910	2680	2314	36x35	
ZP-21	1170	720	1410	450	4560	569	645	1400	925	3266	3000	2910	2680	2442	36x35	
ZP-31	1300	830	1580	500	5057	530	690	1520	915	3612	3400	3310	3080	2804	50x35	
ZP-31B	1300	830	1580	500	5109	530	690	1700	750	3830	2800	2710	2480	2879	60x35	
ZP-41A	1350	1022	1775	0	5563	754	645	1730	853	3957	3000	-	2524	3163	welded construction	
ZP-41	1450	1357	1860	0	6101	790	740	1880	1047	4265	3300	3210	2980	3289	60x35	
ZP-41B	1550	1300	1955	0	6151	790	740	2030	886	4475	3300	3210	2980	3289	60x35	
ZP-41B	1550	1300	2105	0	6509	790	740	2211	886	5627	3300	3210	2980	3772	60x35	

### Z-PELLER® CPP Series

Model	Dimension (mm)															
	L	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>4</sub>	H <sub>5</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	DN	N x B	
ZP-31CP	1300	858	1580	500	4857	530	690	1520	915	3612	3400	3310	3080	2804	50 x 35	
ZP-41CP	1450	1270	1905	0	6117	790	740	1880	1063	4265	3300	3210	2980	3289	60 x 35	
ZP-52CP	1700	1881	2350	0	7231.7	900	820	2360	1110	5132.5	3300	3210	2980	3905	60 x 35	



### Selection Chart for Z-PELLER® Propulsion Package

Bollard Pull 100%	Main Engine			Z-PELLER®	
	Model	Engine Speed min <sup>-1</sup>	Max. Cont. Rating kWm/ PS	Model	Propeller Dia. mm

#### FPP Packages (2units / 1ship)

25	6L19HX	1000	735/1000	ZP-09	1600
33	6L22HX	1000	956/1300	ZP-10	1750
40	6L25HX	750	1176/1600	ZP-11A	1900
45	6L25HX	750	1323/1800	ZP-21	2000
52	6L26HLX	750	1471/2000	ZP-31	2200
55	6L28HX	750	1618/2200	ZP-31	2200
60	6L28HX	750	1654/2250	ZP-31B	2300
65	6L28HX	750	1838/2500	ZP-41A	2600
70	6L28HX	750	1838/2500	ZP-41	2700
80	6L28AHX	800	2206/3000	ZP-41	2700
85	8L28HX	750	2427/3300	ZP-41	2700
85	8L28AHX	750	2574/3500	ZP-41B	2700
90	8L28AHX	750	2574/3500	ZP-41B	2800
100	8L28AHX	800	2942/4000	ZP-41B	3100

#### FPP Packages (3units / 1ship for Rotortug)

60	6L25HX	750	1323/1800	ZP-21	2000
80	6L28HX	750	1654/2250	ZP-31	2300
112	6L28AHX	800	2206/3000	ZP-41	2700
120	8L28HX	750	2427/3300	ZP-41	2700
125	8L28AHX	750	2574/3500	ZP-41B	2800

#### CPP Packages (2units / 1ship)

45	6L25HX	750	1323/1800	ZP-31CP	2200
50	6L26HLX	750	1471/2000	ZP-31CP	2300
60	6L28HX	750	1838/2500	ZP-41CP	2700
75	6L28AHX	800	2206/3000	ZP-41CP	2700
110	9L28AHX	800	3310/4500	ZP-52CP	3200

[Note | Z-PELLER® FPP Series & Z-PELLER® CPP Series

\* Type of propeller : 4 bladed Fixed/Controllable pitch skewed kaplan type with kort nozzle.

\* Steering system : Main engine driven P.T.O. driven and/or Electric motor driven.

\* Maximum continuous input is shown as per one unit base.

\* Bollard pull is shown as per two units tt base, with bollard pitch, ahead pull at MCR engine speed.

[Note | Main Engines

\* Maximum continuous rating shows the matching with each Z-PELLER® Max. continuous input power.

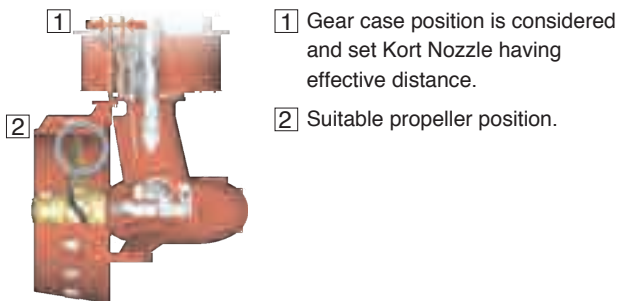
\* Maximum continuous rating is applied for Marine diesel oil (A oil, ISO8217) or gas oil.

## Research and Development

Ongoing Research and Development for Z-PELLER® will be given continuously in order to improve its performance. The results of various tests and analyses generate the best solution at the design for propulsion and maneuvering system.



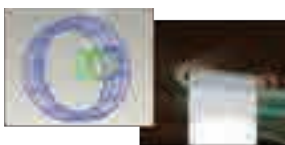
## Excellent high performance (Bollard Pull)



Z-PELLER® generates powerful thrust and excellent efficiency by best strut shape and also suitable distance between strut and nozzle.

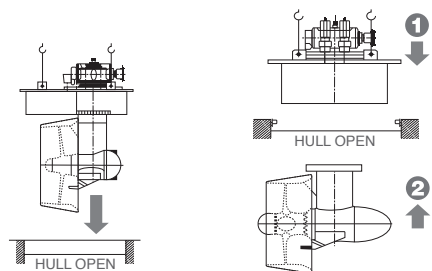


Option is available at large capacity Z-PELLER® for performing much greater thrust power applying specially designed kort nozzle.



## Easy Installation

- Z-PELLER® is suitable for any mounting.
- Auxiliaries ready for mounting on the thruster.
- Simple and effective lube oil system.
- Compact closed loop hydraulic steering system.



Unity Mount Type

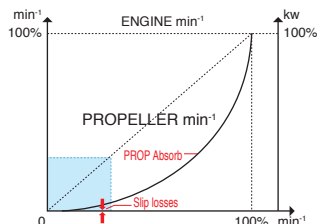
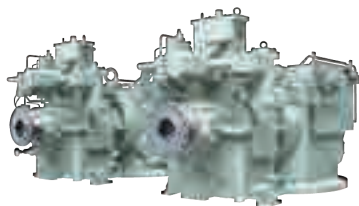
Separate Mount Type





## Idle Slipping Clutch

- Idle slipping device is include in as standard application.
- Shaft brake assists automatically at slow speed operation.
- Simple structure.
- All pumps are driven by power take off system of main engine.

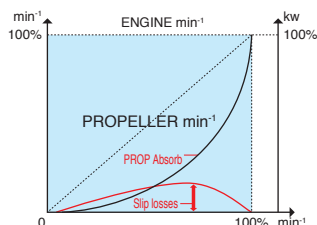


### Idle SLIPPING CLUTCH

Slipping control can be done only when main engine is at idling.

## Dual Modulation Clutch

Dual modulation clutch can accept fully to apply for fire fighting pump and shaft generator with fixed pitch propeller type NIIGATA Z-PELLER® instead of controllable pitch propeller.



### DUAL MODULATION CLUTCH

Slipping control can be done when main engine is at rated speed constant.



## Remote Control System

Integrated complete NIIGATA control system is ensuring fine handling for ship. Handle type GSO lever, UNI lever, and S-Con lever consolidated into the control system make sure

the best matching with all rounding requirement of steering vessels. Interface with Auto Pilot system, Dynamic Positioning System, Fi-Fi mode etc.



## PTO (Power Take Off) Fire fighting system & Shaft generating system

Fire fighting system and Shaft generating system are available through power take-off at Main Engine front end as providing the best solution at variety of ship applications. NIIGATA brand Dual Modulation Clutch is ensuring reliable operation under power package of

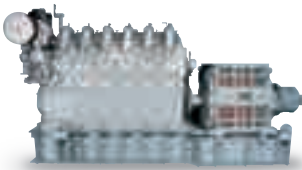
PTO at Main Engine front end and driving Z-PELLER® via Main Engine output.





# Niigata Diesel Generator Set

NIIGATA diesel generator sets, comprising generator and diesel engines mounted on a common base frame, are available for power generations and diesel-electric propulsion system. All generator sets listed in this section are based on NIIGATA standard that means Low voltage onl.,Large diesel generator sets are delivered for separate mounting of diesel engine and generator.



## Specifications of Generator

Model	Engine Capacity		Gene. Capacity		Engine Speed	Cyl. Bore	Piston Stroke	Approx. Dry Mass
	kWm	PS	kWe	kVA	min <sup>-1</sup>	mm	mm	t
6NSD-G	485	660	446	550	1500	160	210	2.9
6L19HX	661	900	615	750	1000	190	260	7
6L22HX	1029	1400	962	1200	1000	220	280	9.1
6L25HX	1323	1800	1250	1550	750	250	350	13
6L26HLX	1471	2000	1390	1700	750	260	350	13.5
6L28HX	1838	2500	1746	2150	750	280	370	16
6L28AHX	2190	2978	2089	2600	750	280	390	20
8L28AHX	2920	3970	2789	3450	750	280	390	26
9L28AHX	3285	4466	3137	3900	750	280	390	28
12V28AHX	4380	5955	4183	5200	750	280	390	36
16V28AHX	5840	7940	5577	6950	750	280	390	45
18V28AHX	6570	8933	6274	7800	750	280	390	50

Model	Engine Capacity		Gene. Capacity		Engine Speed	Cyl. Bore	Piston Stroke	Approx. Dry Mass
	kWm	PS	kWe	kVA	min <sup>-1</sup>	mm	mm	t
6NSD-G	441	600	406	500	1200	160	210	2.9
6L19HX	661	900	615	750	900	190	260	7
6L22HX	956	1300	894	1100	900	220	280	9.1
6L25HX	1250	1700	1181	1450	720	250	350	13
6L26HLX	1397	1900	1320	1650	720	260	350	13.5
6L28HX	1765	2400	1677	2050	720	280	370	16
6L28AHX	2100	2855	2003	2500	720	280	390	20
8L28AHX	2800	3807	2674	3300	720	280	390	26
9L28AHX	3150	4283	3008	3750	720	280	390	28
12V28AHX	4200	5710	4011	5000	720	280	390	36
16V28AHX	5600	7614	5348	6650	720	280	390	45
18V28AHX	6300	8566	6017	7500	720	280	390	50

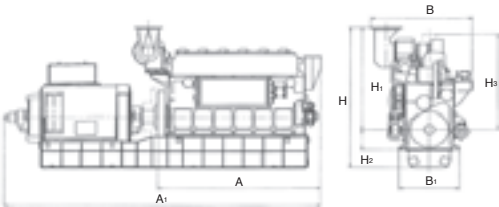
Model	Dimension (mm)							
	A	A <sub>1</sub>	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	B	B <sub>1</sub>
6NSD-G	1896	3122	1592.5	1088	200	1210	1088	798
6L19HX	2524	4756	2272	1472	320	1550	1475	800
6L22HX	2700	4925	2579	1729	330	1690	1553	890
6L25HX	3200	5545	2836	2066	380	2130	1754	1040
6L26HLX	3864	6664	2921	2201	380	2080	1795	1040
6L28HX	3953	7081	3142	2260	400	2210	1824	1130
6L28AHX	4710	7760	3485	2410	445	2100	1750	1200
8L28AHX	5610	8660	3625	2550	445	2100	2067	1200
9L28AHX	6060	9110	3625	2550	445	2100	2067	1200
12V28AHX	5260	8651	3370	2425	445	1910	2200	1450
16V28AHX	6450	9839	3525	2580	445	1910	2300	1450
18V28AHX	7100	10375	3725	2780	445	1910	2350	1450

## Specification of Dual Fuel Generator

Model	Engine Capacity		Gene. Capacity		Engine Speed	Cyl. Bore	Piston Stroke	Approx. Dry Mass
	kWm	PS	kWe	kVA	min <sup>-1</sup>	mm	mm	t
6L28AHX-DF	1801	2449	1711	2100	750	280	390	22
8L28AHX-DF	2401	3264	2291	2850	750	280	390	28
9L28AHX-DF	2701	3672	2579	3200	750	280	390	31

Model	Engine Capacity		Gene. Capacity		Engine Speed	Cyl. Bore	Piston Stroke	Approx. Dry Mass
	kWm	PS	kWe	kVA	min <sup>-1</sup>	mm	mm	t
6L28AHX-DF	1729	2351	1643	2050	720	280	390	22
8L28AHX-DF	2305	3134	2199	2700	720	280	390	28
9L28AHX-DF	2593	3525	2476	3050	720	280	390	31

Model	Dimension (mm)							
	L <sub>1</sub>	L <sub>2</sub>	W <sub>1</sub>	W <sub>2</sub>	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>4</sub>
6L28AHX-DF	5049	5099	1955	1200	2240	445	3315	2040
8L28AHX-DF	5920	5970	1956	1200	2370	445	3445	2040
9L28AHX-DF	6370	6420	2051	1200	2370	445	3445	2040



## NICO Precision Co., Inc.

As a part of IHI Power Systems Co., Ltd., embracing a solid commitment to uncompromisingly stringent quality control, NICO Precision manufactures products of superior quality and performance ensuring all users full peace of mind. We also provide services that all customers can truly appreciate.



Fuel Injection System

## Fuel Injection Pumps

Fuel injection pumps compress fuel oil and supply the oil, under high pressure, to the fuel injection nozzle. NICO Precision's fuel injection pumps boast outstanding quality and durability to withstand pressures up to 160MPa. They are used worldwide in engines of all kinds.



## Fuel Injection Nozzles

Fuel Injection Nozzles atomize high-pressure oil and inject it into the engine's cylinders. NICO Precision's nozzles offer optimal performance that brings out excellent performance in the engine.



## Fuel Injection Valves

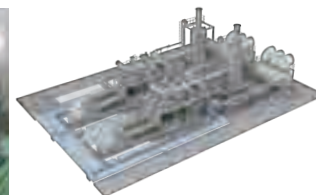
Fuel Injection Valves supply high-pressure oil from the fuel injection pump to the fuel injection nozzle in order to control injection starts.

NICO Precision's fuel injection valves provide superlative reliability to prevent fuel leakage and robust durability to withstand high pressure levels.



## Land Use

NIIGATA Stationary Diesel & Gas engines and Gas Turbine engines as prime movers of generating sets have been delivered to the world-wide owners as applications for building, factory, power plant under the design for proven reliability, low emissions, low operating cost to meet owner's requirements.



## Rail Traction

NIIGATA has been producing the railway vehicle engines for more 80 years and offer the high reliability and prominent power through our tradition, experience, and the-state-of-the-art.



DMF13HZA





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TEL:+54-11-4303-0291 FAX:+54-11-4303-0305

### PROIOS S.A.

Ministro Brin 774 Buenos Aires (C1158AAH) Argentina  
TEL:+54-11-4307-8799 FAX:+54-11-4300-5142

# Africa

## MAURITIUS

### Design 2 Ltd.

6, Sir William Newton St, P.O.Box 1011, Port Louis, Mauritius  
TEL:+230-208-8413 FAX:+230-208-8414

## EGYPT

### El-Ramly Import and Export and General Agents

97 Corniche el-Nil, Cairo, 11231 Egypt  
TEL:+20-2-7547182 FAX:+20-2-7546998

## NAMIBIA

### Diesel Power Services Namibia (PTY/LTD)

Corner of Allan Dean Martin Str & Hanna Mupetami Street, P.O. Box 4710,  
Walvis Bay, Namibia  
TEL:+264-81-2759932 or 1400402 FAX:+264-64-205004

## Questionnaire

1. Date
2. Ref. No.
3. Company Name / Type of business / Address
4. End User Name / Type of business / Address
5. Shipyard Name / Address
6. New built or re-powering
7. Type of vessel
8. Operation Country /Service Area /Flag
9. No. of Vessel
10. Delivery Time
11. Delivery CIF Port
12. Classification / Class Notation detail
13. Engine
  - Required Output (kW)
  - Units per vessel
  - Front End PTO ☐ Port or Stbd ☐ Both
  - Cooling system ☐ FW/SW ☐ Central cooling
  - LO sump system ☐ Wet sump ☐ Dry sump
  - Type of Fuel ☐ MDO ☐ HFO ☐ LNG
  - Drive ☐ Direct ☐ Diesel Electric
14. Z-PELLER®
  - Input Power (kW)
  - Input Speed (min<sup>-1</sup>)
  - Units per vessel
  - Location of R/C
  - Required Bollard Pull (Ahead/Astern)
  - Required Hull Speed with condition
15. Other Propulsion System
16. Electric Power (V, Hz)
17. Site Condition at ECR
  - Ambient Air Temp.
  - Sea water Temp.
  - LTFW inlet Temp.
18. General & Machinery section of hull spec. (reference)
19. General Arrangement of vessel (reference)
20. Option
  - Engine Resilient Mounting
  - SCR for Tier III
  - Required Additional Spare Parts

## Conversion Table

Force	1 tf	=	9.807 kN
	1 N	=	0.102 kgf
Power	1 kW	=	1.360 PS
	1 kW	=	1.341 bhp
Heating Value	1 HP	=	1.014 PS
	1 kWh	=	860 kcal
	1 cal	=	4.187 J
Length	1 BTU	=	1.055 kJ
	1 inch	=	2.540 cm
	1 foot	=	0.305 m
	1 yard	=	3 feet
	1 mile	=	1.609 km
Fluid Volume	1 naut.mile	=	1.853 km
	1 UK Gallon	=	4.546 l
	1 US Gallon	=	3.785 l
	1 US Barrel	=	0.159 m <sup>3</sup> = 42 US Gallons
Pressure	1 MPa	=	10.197 kgf/cm <sup>2</sup>
	1 mm Hg	=	1.333mbar(133.3Pa)



