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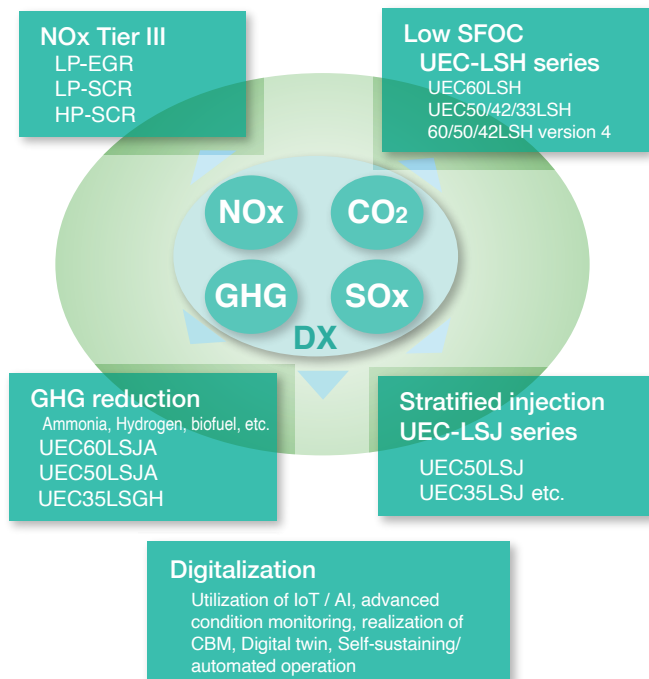


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To achieve carbon neutrality

IMO adopted the IMO GHG reduction strategy in 2018, setting GHG emission reduction targets of "50% emissions reduction by 2050". The Japanese Ministry of Land, Infrastructure, Transport and Tourism indicated a policy of "proposing to IMO to aim for carbon neutrality in international shipping by 2050" in 2021. Strategy review work began in 2021, and in July 2023 at MEPC80, the "2023 IMO GHG reduction strategy" was adopted, which includes newly enhanced GHG reduction targets, including "zero GHG emissions by around 2050". In this new GHG reduction strategy, new targets have been agreed regarding the percentage of use of zero-emission fuels, etc., and reduction targets have been set for achieving zero GHG emissions around 2050.

We have provided a variety of solutions to respond to the NOx, SOx, and CO₂ emission regulations that have been phased-in. In addition, we are working on the development of next-generation fuel engines to address the requirement for significant reductions in GHG emissions in the future.

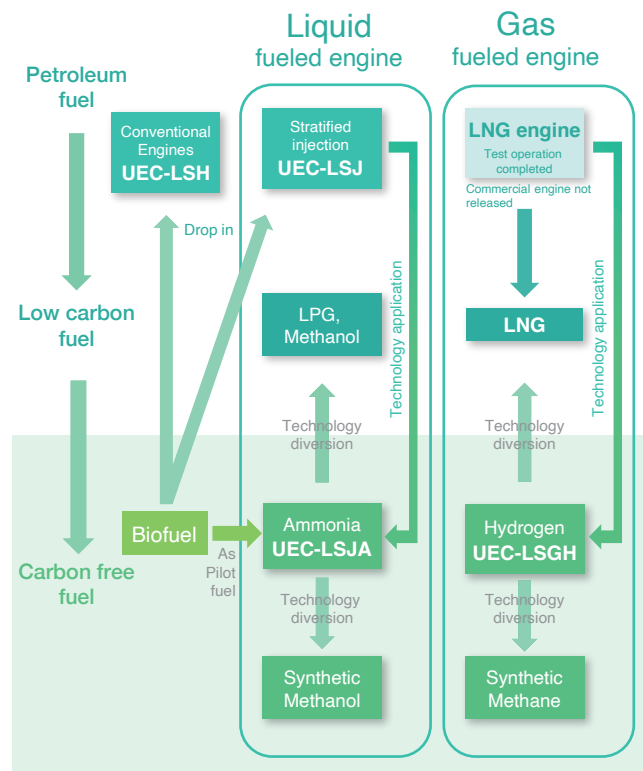


Technology strategy for UE Engine (Overview)

Next-generation fuel engines

To achieve carbon neutrality by 2050, it is necessary to start replacing old vessels with the vessels that can significantly reduce GHGs from the late 2020s. Although, alternative fuels such as LNG, LPG, and methanol are expected to serve as bridge solutions, the GHG reduction rate is only about 20%. We believe that the use of decarbonized fuels is indispensable, and we are working on the development of ammonia fuel and hydrogen fuel engines.

The core technologies of these next-generation fuel engines can be applied to a wide variety of liquid and gas fuels, including methanol, and have broad deployment potential for the future.



Carbon neutral strategy for UE engine

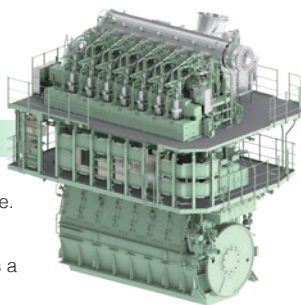
Ammonia

fueled engine

UEC-LSJA

UEC50LSJA is scheduled to be completed in FY2025. Ammonia fuel is hardly flammable. It is a technical challenge to achieve efficient combustion and to minimize the generation of nitrous oxide (N_2O), which has a high global warming potential.

Ammonia fueled engines use our proprietary "Stratified injection technology" to solve these problems by optimizing combustion control. It is possible to change a co-combustion rate of ammonia in accordance with the future progress of ammonia infrastructure development and trends in environmental regulations, thereby contributing to avoiding loss of ship's competitiveness and ship obsolescence.



■Issues and Measures for Ammonia fueled engine

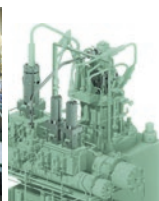
Issues	Measures
Hardly flammable. The combustion speed is low at 1/5 of methane, and the minimum self-ignition temperature is high at 651°C.	Proprietary stratified injection technology controls optimal combustion
Possibility of generating greenhouse gas N_2O	Stratified injection technology minimizes N_2O generation (emission)
Possibility of generating Fuel NO_x	Exhaust gas after-treatment equipment (SCR) applied
Toxicity	Applying safety measures such as double wall piping, purging, separation and recovery equipment, etc.
Corrosive	Selection of appropriate materials with corrosion resistance

■Various Verification Activities

Various verifications of the ammonia-fueled single-cylinder test engine were successfully completed in September 2024.



Ammonia fueled test engine



Ammonia fuel tank

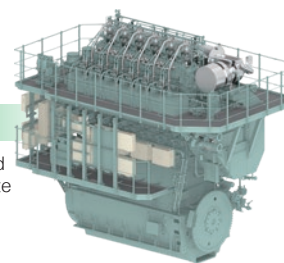
Hydrogen

fueled engine

UEC-LSGH

UEC35LSGH is scheduled to be completed in FY2026. Hydrogen fuels are easy to ignite and burn very quickly. Therefore, stable control of their combustion is an issue.

We are developing a hydrogen fueled engine that uses a "high-pressure injection system" that directly injects hydrogen when the combustion chamber reaches high temperature and high pressure. Furthermore, we are aiming for the practical application of hydrogen firing engines with even higher environmental performance reducing pilot fuel amount.



■Issues and Measures for Hydrogen fueled engine

Issues	Measures
The combustion speed is very fast and the minimum ignition energy is small.	Establishment of stable combustion control technology is necessary.
Have a wide flammable range of air-hydrogen ratio	Safety measures such as double wall piping and purging are to be applied.
Concern about hydrogen embrittlement, which reduces mechanical properties by entering metallic materials.	Selection of appropriate materials with hydrogen embrittlement resistance
Easy to leak because of small molecular weight	Establishment of gas sealing technology
International standards are not yet in place	Japan leads in the creation of international standards

■Various Verification Activities

Bench tests of the hydrogen injection unit were conducted, and it was confirmed that the expected operational performance was achieved. Endurance tests were also completed. Overhaul inspection results were also good.



Hydrogen injection test bench



Hydrogen injection unit

The development of ammonia and hydrogen fueled engines is part of the Green Innovation Fund project of the New Energy and Industrial Technology Development Organization (NEDO).

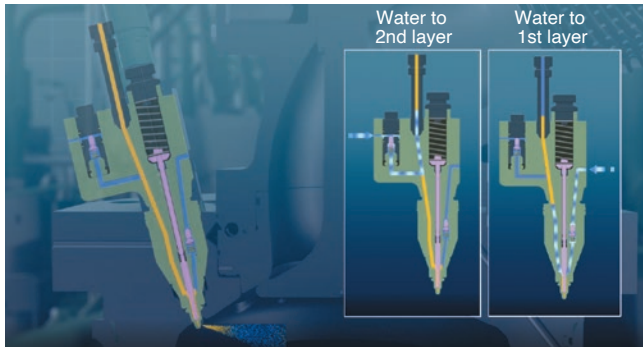
Pursuit of environmental performance

UEC-LSJ series combines our original "complete combustion technology" and "Stratified water injection technology" based on the LSH series, and is an engine that uses only by MGO or MDO as fuel.



5UEC50LSJ-EGR overview

Stratified water injection is a technology that injects fuel and water in layers from a single fuel valve. After fuel injection, water is loaded into the fuel injection line from the water injection pump before the next fuel injection. By combining complete fuel-efficient tuning with Stratified water injection technology that can effectively reduce NOx, NOx emissions are reduced and fuel consumption is greatly reduced.

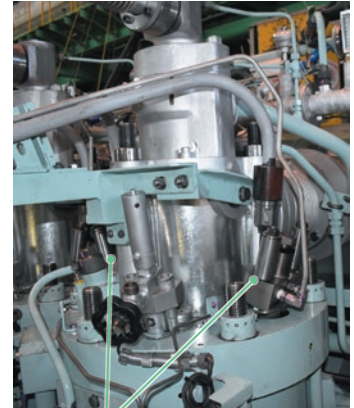


Fuel injection valve for stratified water injection

Stratified water injection unit on 6UEC35LSJ



Fuel injection pump (left)
Water injection pump (right)



Fuel injection valves
(Stratified injection)

Benefits for all shipping stakeholders

Stratified water injection + MGO/MDO mono-fuel can lead various benefits to all shipping stakeholders. In addition to the advantage of excellent fuel efficiency, there is no need to heat the fuel, which eliminates the need for heating systems and piping, eliminating the need for crew work related to conventional heavy fuel oil. In addition, since it is a high-quality fuel, it can reduce engine trouble and wear.

For shipping company

- Excellent fuel-efficient
(Both sailing and anchored)
- Reduce Non-operation risk
- CSR improvement

For ship owner

- Improved engine reliability
- Reduce non-operation risk
- Maintenance cost reduction
- Reduce marine pollution risk

For crew

- Easy operation
(No fuel change over)
- Less maintenance work
→ Burden reduction

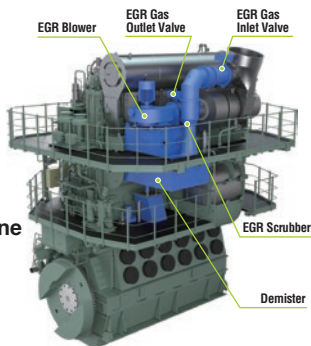
For shipyard

- No SOx scrubber
- Simplified engine room
(mono-fuel, no-heating)



Low Pressure EGR System

Low Pressure EGR gas line is located off the Turbocharger. EGR Unit is installed on the engine as shown in the right figure.



Features

■ Simple System

- Low pressure and low temperature require less equipment & pipes, allowing for a simple structure.

■ Simple Operation

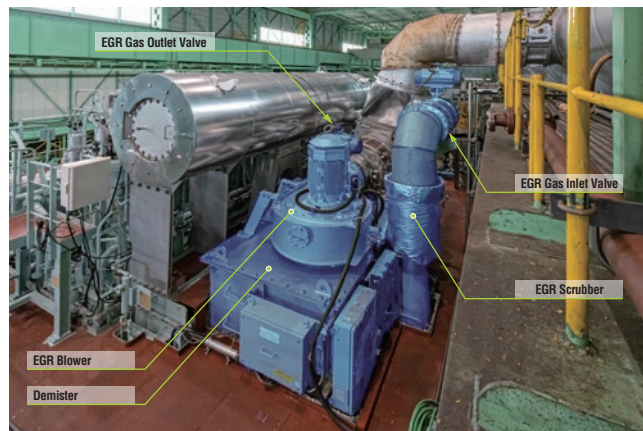
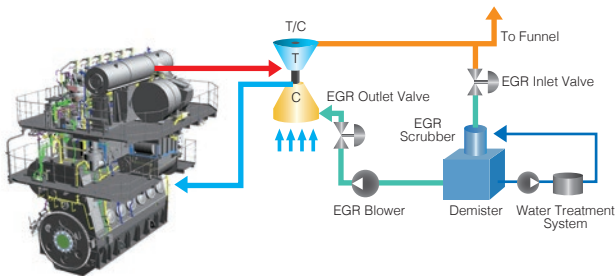
- Operation is executed by an on/off control of the EGR valves.

■ Low CAPEX, Low OPEX

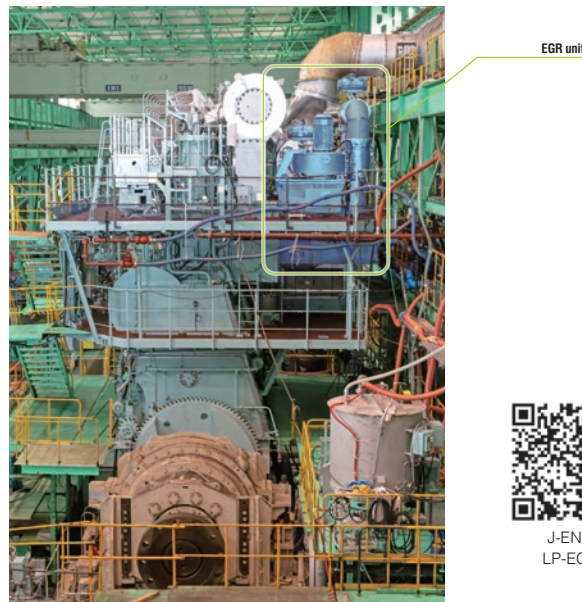
- Low capital expenditure required to produce this simple system.
- The EGR blower's low electric power consumption, coupled with no requirement for additional boiling for steam allows for low operating costs.

■ Applicable to a Variety of Engines

- Low Pressure EGR System fits well with any low speed marine engine.



First integrated EGR unit on 6UEC50LSH-Eco-C2-EGR



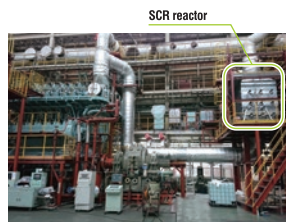
J-ENG
LP-EGR

6UEC50LSH-Eco-C2-EGR overview

SCR System

UEC small bore-size engines have applied the LP-SCR system as standard Tier III solution. Other size engines (over 40 cm bore-size) have applied LP-EGR or HP-SCR system.

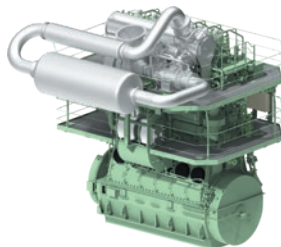
The specific engines, which can apply the HP-SCR system, shows on the table of next page.



Overview of 6UEC33LSE-C2-SCR in work shop

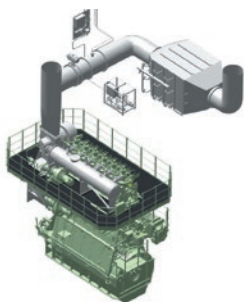
■HP-SCR system:

The components of the HP-SCR system are installed before turbocharger(s) on high pressure exhaust side. A part of the HP-SCR system is integrated in engine configuration and the HP-SCR system works with engine control. The reactor for HP-SCR is designed to be more compact than that of LP-SCR, due to the higher density of the exhaust gas.



■LP-SCR system:

The components of the LP-SCR system are installed after turbocharger(s) on low pressure exhaust side. The LP-SCR system separates from engine configuration and control. Therefore, the arrangement and control of the LP-SCR system is simple.



■Applied Tier III technologies to UEC Engine

Tier III solution is due to the engine type, as shown in the below table. For medium or large bore-size engines, the EGR system is available. In addition, the HP-SCR are available for specified engines in medium or large bore-size engines.

The LP-SCR system is recommended for small bore size engines and mechanically controlled engines (camshaft driven).

If you would like to apply the solution which is not applicable to the engines in the below table, J-ENG will consider applying it. Please contact J-ENG and/or licensees.

Engine type	Applied Tier III technology		
	EGR	HP-SCR	LP-SCR
UEC50LSJ	✓	✓	
UEC42LSJ	✓	✓	
UEC35LSJ			✓
UEC60LSH-Eco	✓	✓	
UEC50LSH-Eco-C3	✓	✓	on request
UEC50LSH-Eco-C2	on request		✓
UEC42LSH-Eco	✓	✓	on request
UEC33LSH			✓
UEC80LSE-Eco	on request	✓	
UEC60LSE-Eco	on request	on request	✓
UEC35LSE-Eco		on request	✓
UEC35LSE			✓
UEC33LSE			✓
UEC33LSII-Eco		on request	✓
UEC33LSII			✓

■Technical documentation

"Technical Data" for Tier III application is available on our web site.

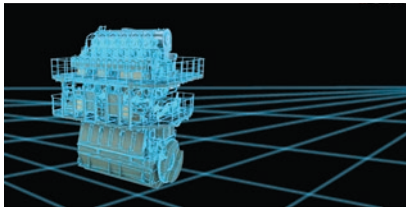
<https://www2.j-eng.co.jp/web/site/tech/TechnicalDataTierIII/>



Technical Data

Utilizing the digital data and creating new value

J-ENG have applied the various computerized system to UE engine for supporting the customers, so far. J-ENG is continuing to develop the new system not only collecting, monitoring and analyzing the engine data, but creating the new valuable and real-time information for the customer, which may contribute to the preventive maintenance and further optimized operation.



Phase 1



CONNECT

Measure and store the operating data

Phase 2



VISUALIZE

Accumulate and visualize the operating data

Phase 3



ANALYZE

Predict the condition and prescribe the next action

Phase 4



CREATE

Further optimize the operating condition
New valuable information

Eco Engine waveform monitoring system



Bearing temperature monitoring system



Bearing wear monitoring system



Cylinder pressure control and monitoring system



Main engine diagnostic system



Upcoming: CBM system



Upcoming: New system, using digital twin technology



IoT Initiatives

We are taking initiatives for research and development, and data analysis, with the goal of creating new value using operational data.

In recent years, sensing technology and analysis have been developed due to the growing interest in IoT and AI technology application, and we aim for customer satisfaction by introducing these technologies and integrating them with our know-how.



CONNECT



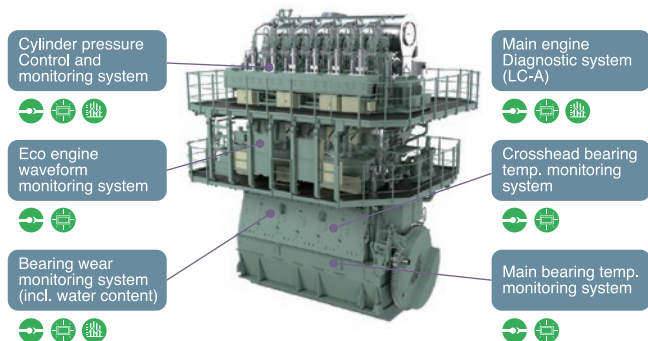
ANALYZE



VISUALIZE



CREATE



CBM Initiatives

We are taking CBM initiatives using the main engine diagnostic system and monitoring system.

Main Engine Diagnostic System

The integrated support system is a navigation support system for the main engine by remote monitoring, using the internal and external networks, and is a total-support package where the following effects can be expected.

Monitoring System Initiatives

As a part of IoT and AI technology applications, we are developing monitoring technologies such as in-cylinder pressure control, electronic control engine waveform monitoring, bearing wear monitoring, and bearing temperature monitoring systems.

Next Generation 5G Eco Control System

J-ENG is focusing on the development of Condition Based Maintenance (CBM) and digital twins technologies, in order to provide more convenient after-sales service to customers. And, J-ENG is developing the 5th generation electronically-control system (5G Eco-system) based on the current 4G Eco-system, so that this CBM and digital twin can be implemented in the future.

By providing this 5G Eco-system and introducing CBM and digital twin technologies, J-ENG can contribute to the optimization of safe operation, energy saving operation, maintenance cost and life cycle cost of customers.



Digital Solution



17



Digital Solution

Digital Solution



8



UE Engines

UE Engine is a large sized, two-stroke and low speed engine type developed in-house using our own technologies. It is widely used in bulk carriers, oil/chemical tankers, pure car & truck carriers, containerhips, LPG carriers, multi-purpose carriers and many other types of vessel.

Main Features of UE Engines

- Economical
- Environmentally friendly
- Highly reliable
- Compact design
- Easy maintenance



UEC Eco-Engine

In addition to the features of UE Engine, the UEC Eco-Engine provide the following benefits:

- Ecological
 - Low NOx emissions
 - Smokeless operation
- Economical
 - Low fuel consumption
 - Low maintenance costs
 - Low cylinder oil consumption
- Excellent condition
 - Reliable
 - Early failure warning system
- Easy to control
 - Stable low-load operation
 - Excellent startup and crush astern

CYLINDER LUBRICATION

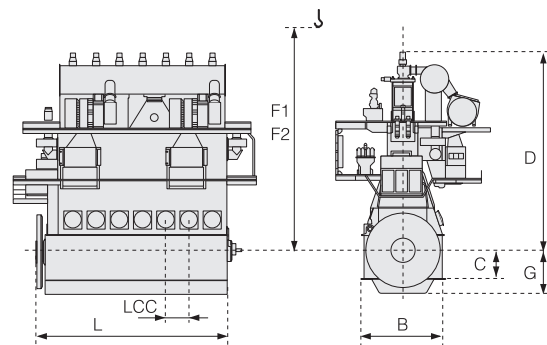
The A-ECL (Advanced Electronically Controlled Lubricating) system can reduce the explicit minimum dosage down to 0.5g/kWh, depending on engine conditions. The A-ECL system can further reduce the cylinder oil feed rate, compared with a mechanical lubricating system, particularly under partial load operation, by controlling cylinder oil consumption according to the mean effective pressure.

Available for
Retrofitting



DIMENSIONS AND WEIGHT

- The engine weight is net in metric tonnes (t), without oil and water.
- The engine weight and dimensions do not include torsional damper, axial damper, tuning wheel and compensator, etc., subject to the design of each project.



- L : Minimum length of engine
- LCC : Distance between cylinder centers
- B : Bedplate width at foot flange
- C : Crankshaft to underside of foot flange
- D : Engine height from crankshaft center
- G : Distance from bedplate bottom to crankshaft center
- F1 : Piston overhaul height with standard tool
- F2 : Piston overhaul height with special tool

As shown in the below table, the specification (welded steel plate or cast iron) of bedplate and column is according to engine type. In this booklet, the weight of engine made by cast iron is shown in brackets.

Engine type	Welded	Cast iron	Engine type	Welded	Cast iron
UEC50LSJ	✓		UEC80LSE-Eco	✓	
UEC42LSJ	✓		UEC60LSE-Eco	✓	
UEC35LSJ	✓	✓*1	UEC35LSE / -Eco	✓	✓*1
UEC60LSH-Eco	✓		UEC33LSE	✓	✓*1
UEC50LSH-Eco	✓		UEC33LSII / -Eco		✓
UEC42LSH-Eco	✓				
UEC33LSH		✓			

*1 : Bedplate can be made by cast iron.
(Column is made by welded steel plate only.)

All UE engine described in this booklet are fully compliant with IMO NOx Tier II and Tier III regulations in ANNEX VI of the MARPOL 73/78.

The specific fuel oil consumption ("SFOC") figures are based on the below conditions,

- ISO standard reference condition
- Diesel fuel oil
- Lower calorific value (LCV) of fuel (42,700 kJ/kg)

ISO standard reference condition (ISO 3046-1 and 15550)

Total barometric pressure	1.0 bar
Ambient air temperature	25 °C
Relative humidity	30 %
Cooling water temperature	25 °C

Tolerance

SFOC guarantee tolerance is as follows;

- 5% tolerance for 100 - 85% engine load
- 6% tolerance for < 85 - 65% engine load
- 7% tolerance for < 65 - 50% engine load

SFOC guarantee can only be at one load point (either MCR or NCR) for Tier II engine or with Tier II mode for Tier III engine.

SFOC optimize

We have added the fuel optimized "Low-SFOC" version, etc. to UE Engine line-up in order to bring maximum benefit to our customers. By changing some engine parts and optimizing the electronically controlled system, the SFOC can be reduced when compared with a conventional "Standard" version. The figures for SFOC for a representative version are described in this booklet.

In addition, the UE Engine has also improved part-load and low-load SFOC by introducing tuning methods such as the LLO (Low Load Optimize), EGB, the turbocharger cut-out system, and so on. Details of each can be discussed with regard to each project according to each customer's requirement.

J-ENG' s Engine Planning Data ("EPD") calculator is an application to obtain the technical information and data for installing the UE engine at an initial stage for new project.

The operation of the EPD calculator is intuitive and visual, so you can obtain the SFOC, engine performance data, auxiliary system, etc. as PDF file, only by selecting or entering the basic specifications of the new project.

The data in this catalog is subject to change without prior notice. For the latest data, please check the data in the EPD calculator.

EPD calculator can be started by accessing the below address or scanning the below QR-code.

<https://www2.j-eng.co.jp/web/site/tech/EPD/PIanning/Page1>



EPD

Other useful information is available

<https://www.j-eng.co.jp/en/index.html>



Technical Data



Installation Drawings



EoD

7UEC60LSH-Eco-C3-HPSCR

Tier III technology

(Blank): Tier II
 EGR: Low Pressure EGR
 HPSCR: High pressure SCR
 LPSCR: Low pressure SCR

SFOC version num.

BMEP number

(Blank): less than 20 bar
 A: 20 bar
 B: 21 bar
 C: 22 or 22.5 bar
 D: 24 bar

Engine control concept

(Blank): Camshaft controlled
 Eco: Electronically controlled

Development code

LSII, LSE, LSH

Bore size in cm

Brand name

Uniflow scavenging
 Exhaust gas turbocharger
 Croshead type

Num. of cylinders

Engine Speed
 (P4-P1/min⁻¹)

72 - 105 UEC60LSH-Eco-C3

81 - 108 UEC50LSH-Eco-C3

81 - 108 UEC50LSH-Eco-C2

85 - 118 UEC42LSH-Eco-D4

85 - 118 UEC42LSH-Eco-D3

145 - 230 UEC33LSH-C2

60 - 80 UEC80LSE-Eco-B1

60 - 80 UEC80LSE-Eco-A2

79 - 105 UEC60LSE-Eco-B1

79 - 105 UEC60LSE-Eco-A2

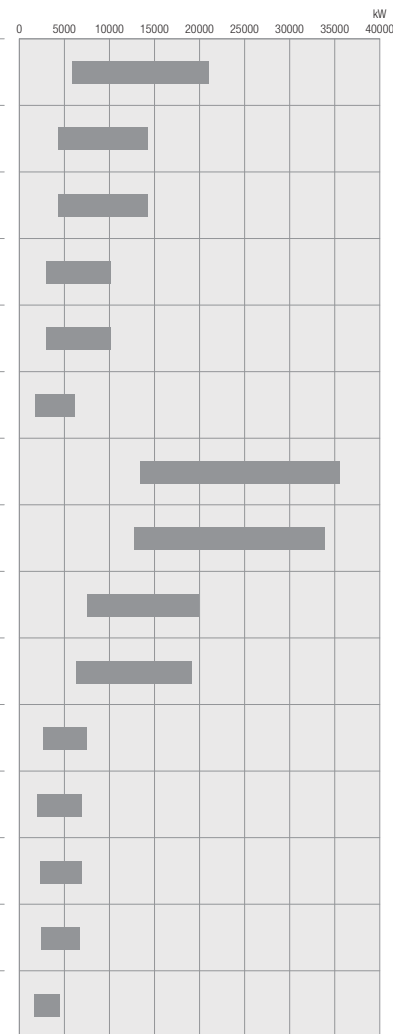
118 - 167 UEC35LSE-Eco-C1
 UEC35LSE-C1

118 - 167 UEC35LSE-Eco-B2

118 - 167 UEC35LSE-B2

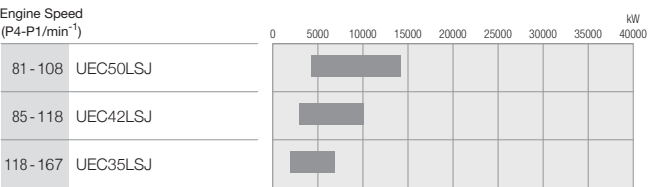
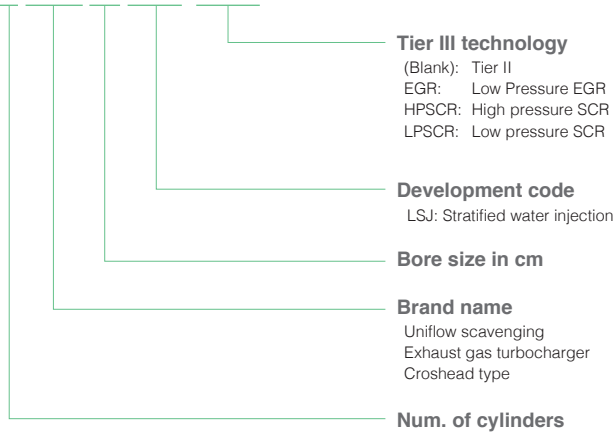
121 - 167 UEC33LSE-C2

157 - 215 UEC33LSII-Eco
 UEC33LSII



6UEC50LSJ-EGR

UE Engines



UE Engines

7UEC50LSJA-HPSCR

Tier III technology

(Blank): Tier II
EGR: Low Pressure EGR
HPSCR: High pressure SCR
LPSCR: Low pressure SCR

Development code

Liquid fuels

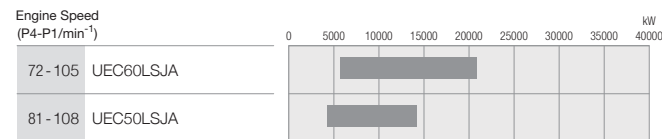
LSJA: Ammonia (DF)

Bore size in cm

Brand name

Uniflow scavenging
Exhaust gas turbocharger
Croshead type

Num. of cylinders



Engine Designation for (Gas fuels, DF)

UEC-LSGH Series Output Range

6UEC35LSGH-LPSCR

Tier III technology

(Blank): Tier II
EGR: Low Pressure EGR
HPSCR: High pressure SCR
LPSCR: Low pressure SCR

Development code

Liquid fuels

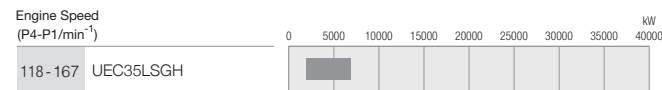
LSGH: Hydrogen (DF)

Bore size in cm

Brand name

Uniflow scavenging
Exhaust gas turbocharger
Croshead type

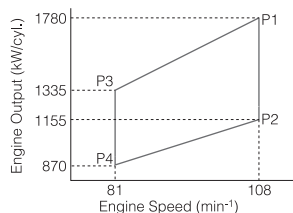
Num. of cylinders



Main specifications

Cylinder bore	[mm]	500
Piston stroke	[mm]	2 300
BMEP at P1	[bar]	21.9
Piston speed at P1	[m/s]	8.3
Stroke / bore	[-]	4.6

Electronically controlled



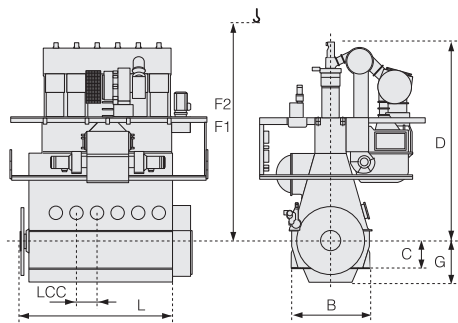
Rated power (kW), principle dimension (mm) and weight (ton)

Speed	108 min ⁻¹				81 min ⁻¹				Dimension	Weight
Cyl.	P1	P2	P3	P4	P1	P2	P3	P4	L	
5	8 900	5 775	6 675	4 350	5 547	199				
6	10 680	6 930	8 010	5 220	6 417	231				
7	12 460	8 085	9 345	6 090	7 287	264				
8	14 240	9 240	10 680	6 960	8 157	297				
Dimensions	LCC	B	C	D	F1	F2	G			
	870	3 350	1 190	8 448	10 050	9 140	1 700			

Tier III added weight (ton)

Cyl	5	6	7	8
EGR	9	11	12	14
HPSCR	*	*	*	*

*: To be determined



SFOC variation

UEC50LSJ, complied with IMO Tier II
SFOC (g/kWh)

Load	P1	P2	P3	P4
100%	163.0	157.0	163.0	157.0
75%	157.5	151.9	157.5	151.9
50%	159.0	154.2	159.0	154.2

UEC50LSJ-EGR, complied with IMO Tier III
SFOC (g/kWh)

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	163.0	157.0	163.0	157.0
	75%	157.5	151.9	157.5	151.9
	50%	159.0	154.2	159.0	154.2
Tier III mode	100%	164.6	158.6	164.6	158.6
	75%	159.1	153.5	159.1	153.5
	50%	160.6	155.8	160.6	155.8

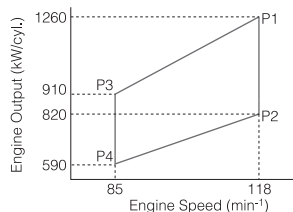
UEC50LSJ-HPSCR, complied with IMO Tier III
SFOC (g/kWh)

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	163.0	157.0	163.0	157.0
	75%	157.5	151.9	157.5	151.9
	50%	159.0	154.2	159.0	154.2
Tier III mode	100%	163.3	157.3	163.3	157.3
	75%	157.7	152.1	157.7	152.1
	50%	159.4	154.6	159.4	154.6

Main specifications

Cylinder bore	[mm]	420
Piston stroke	[mm]	1 930
BMEP at P1	[bar]	24.0
Piston speed at P1	[m/s]	7.6
Stroke / bore	[-]	4.60

Electronically controlled



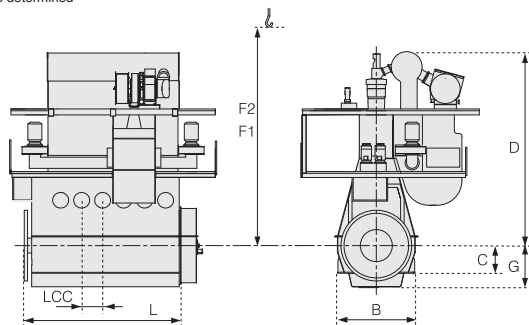
Rated power (kW), principle dimension (mm) and weight (ton)

Speed	118 min⁻¹				85 min⁻¹				Dimension	Weight
Cyl.	P1	P2	P3	P4	P1	P2	P3	P4	L	
5	6 300	4 100	4 550	2 950	4 857	149				
6	7 560	4 920	5 460	3 540	5 617	174				
7	8 820	5 740	6 370	4 130	6 337	200				
8	10 080	6 560	7 280	4 720	7 137	224				
Dimensions	LCC	B	C	D	F1	F2	G			
	760	2 800	1 000	6 952	8 700	7 830	1 490			

Tier III added weight (ton)

Cyl	5	6	7	8
EGR	6	8	9	10
HPSCR	*	*	*	*

*: To be determined



SFOC variation

UEC42LSJ, complied with IMO Tier II
SFOC (g/kWh)

Load	P1	P2	P3	P4
100%	163.0	157.0	163.0	157.0
75%	157.5	151.9	157.5	151.9
50%	159.0	154.2	159.0	154.2

UEC42LSJ-EGR, complied with IMO Tier III
SFOC (g/kWh)

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	163.0	157.0	163.0	157.0
	75%	157.5	151.9	157.5	151.9
	50%	159.0	154.2	159.0	154.2
Tier III mode	100%	164.6	158.6	164.6	158.6
	75%	159.1	153.5	159.1	153.5
	50%	160.6	155.8	160.6	155.8

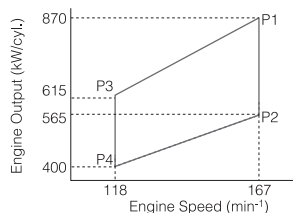
UEC42LSJ-HPSCR, complied with IMO Tier III
SFOC (g/kWh)

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	163.0	157.0	163.0	157.0
	75%	157.5	151.9	157.5	151.9
	50%	159.0	154.2	159.0	154.2
Tier III mode	100%	163.3	157.3	163.3	157.3
	75%	157.7	152.1	157.7	152.1
	50%	159.4	154.6	159.4	154.6

Main specifications

Cylinder bore	[mm]	350
Piston stroke	[mm]	1 550
BMEP at P1	[bar]	21.0
Piston speed at P1	[m/s]	8.6
Stroke / bore	[-]	4.43

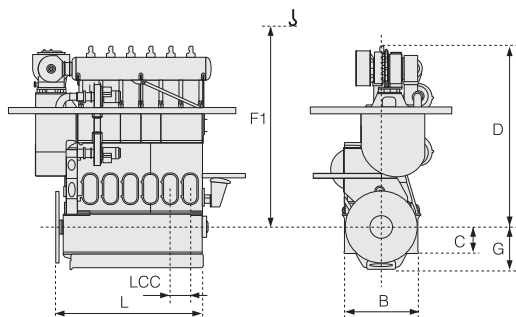
Electronically controlled with exhaust camshaft



Rated power (kW), principle dimension (mm) and weight (ton)

Speed	167 min ⁻¹				118 min ⁻¹		Dimension	Weight
Cyl.	P1	P2	P3	P4	P1	P4	L	
5	4 350	2 825	3 075	2 000	4 398	83	(85)	
6	5 220	3 390	3 690	2 400	5 010	93	(95)	
7	6 090	3 955	4 305	2 800	5 622	104	(107)	
8	6 960	4 520	4 920	3 200	6 234	116	(119)	
Dimensions	LCC	B	C	D	F1	G		
	612	2 284	830	5 623	6 725	1 326		

Weight in () is for engine of bedplate, made by cast iron.



SFOC variation

UEC35LSJ, complied with IMO Tier II

SFOC (g/kWh)

Load	P1	P2	P3	P4
100%	168.5	162.5	168.5	162.5
75%	163.0	157.4	163.0	157.4
50%	164.6	159.8	164.6	159.8

UEC35LSJ-LPSCR, complied with IMO Tier III

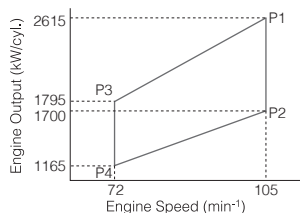
SFOC (g/kWh)

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	168.5	162.5	168.5	162.5
	75%	163.0	157.4	163.0	157.4
	50%	164.6	159.8	164.6	159.8
Tier III mode	100%	168.5	163.5	168.7	164.0
	75%	164.0	158.7	164.6	159.2
	50%	165.1	160.2	165.9	161.1

Main specifications

Cylinder bore	[mm]	600
Piston stroke	[mm]	2 400
BMEP at P1	[bar]	22.0
Piston speed at P1	[m/s]	8.4
Stroke / bore	[-]	4.0

Electronically controlled



Rated power (kW), principle dimension (mm) and weight (ton)

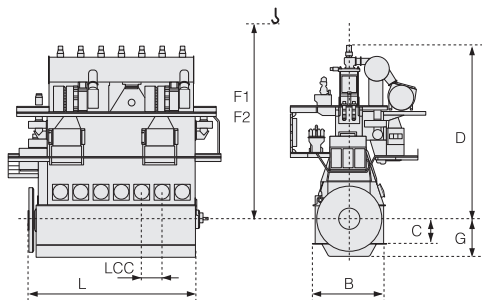
Speed	105 min ⁻¹			72 min ⁻¹			Dimension L	Weight
Cyl.	P1	P2	P3	P4	P1	P2		
5	13 075	8 500	8 975	5 825	6 502	283		
6	15 690	10 200	10 770	6 990	7 442	329		
7	18 305	11 900	12 565	8 155	8 382	375		
8	20 920	13 600	14 360	9 320	9 322	424		
Dimensions	LCC	B	C	D	F1	F2	G	
	940	3 420	1 300	8 903	10 800	10 040	1 870	

Weight will be changed during development period.

Tier III added weight (ton)

Cyl	5	6	7	8
EGR	13	16	18	21
HPSCR	*	*	*	*

*: To be determined



SFOC variation

UEC60LSH-Eco-C3, complied with IMO Tier II
SFOC (g/kWh) with standard

Load	P1	P2	P3	P4
100%	167.0	161.0	167.0	161.0
75%	161.5	155.9	161.5	155.9
50%	163.0	158.2	163.0	158.2

UEC60LSH-Eco-C3, complied with IMO Tier II
SFOC (g/kWh) with LLO

Load	P1	P2	P3	P4
100%	168.6	162.6	168.6	162.6
75%	160.8	155.2	160.8	155.2
50%	161.5	156.7	161.5	156.7

UEC60LSH-Eco-C3, complied with IMO Tier II
SFOC (g/kWh) with LLO+EGB

Load	P1	P2	P3	P4
100%	170.1	164.1	170.1	164.1
75%	160.8	155.2	160.8	155.2
50%	160.8	156.0	160.8	156.0

UEC60LSH-Eco-C3-EGR, complied with IMO Tier III
SFOC (g/kWh) with LLO+EGB

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	170.1	164.1	170.1	164.1
	75%	160.8	155.2	160.8	155.2
	50%	160.8	156.0	160.8	156.0
Tier III mode	100%	170.2	164.2	170.2	164.2
	75%	162.4	156.8	162.4	156.8
	50%	163.1	158.3	163.1	158.3

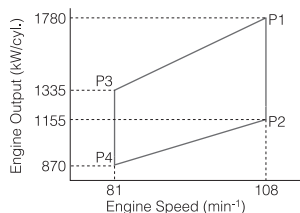
UEC60LSH-Eco-C3-HPSCR, complied with IMO Tier III
SFOC (g/kWh) with LLO+EGB

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	170.1	164.1	170.1	164.1
	75%	160.8	155.2	160.8	155.2
	50%	160.8	156.0	160.8	156.0
Tier III mode	100%	170.4	164.4	170.4	164.4
	75%	161.0	155.4	161.0	155.4
	50%	161.2	156.4	161.2	156.4

Main specifications

Cylinder bore	[mm]	500
Piston stroke	[mm]	2 300
BMEP at P1	[bar]	21.9
Piston speed at P1	[m/s]	8.3
Stroke / bore	[-]	4.60

Electronically controlled



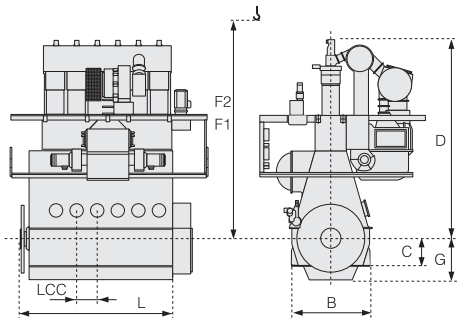
Rated power (kW), principle dimension (mm) and weight (ton)

Speed	108 min ⁻¹				81 min ⁻¹				Dimension	Weight
Cyl.	P1	P2	P3	P4	P1	P2	P3	P4	L	
5	8 900	5 775	6 675	4 350	5 547	194				
6	10 680	6 930	8 010	5 220	6 417	225				
7	12 460	8 085	9 345	6 090	7 287	257				
8	14 240	9 240	10 680	6 960	8 157	289				
Dimensions	LCC	B	C	D	F1	F2	G			
	870	3 350	1 190	8 448	10 050	9 140	1 700			

Tier III added weight (ton)

Cyl	5	6	7	8
EGR	9	11	12	14
HPSCR	*	*	*	*

*: To be determined



SFOC variation

UEC50LSH-Eco-C3, complied with IMO Tier II
SFOC (g/kWh) with standard

Load	P1	P2	P3	P4
100%	168.0	162.0	168.0	162.0
75%	162.5	156.9	162.5	156.9
50%	164.0	159.2	164.0	159.2

UEC50LSH-Eco-C3, complied with IMO Tier II
SFOC (g/kWh) with LLO

Load	P1	P2	P3	P4
100%	169.6	163.6	169.6	163.6
75%	161.8	156.2	161.8	156.2
50%	162.5	157.7	162.5	157.7

UEC50LSH-Eco-C3, complied with IMO Tier II
SFOC (g/kWh) with LLO+EGB

Load	P1	P2	P3	P4
100%	171.1	165.1	171.1	165.1
75%	161.8	156.2	161.8	156.2
50%	161.8	157.0	161.8	157.0

UEC50LSH-Eco-C3-EGR, complied with IMO Tier III
SFOC (g/kWh) with LLO+EGB

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	171.1	165.1	171.1	165.1
	75%	161.8	156.2	161.8	156.2
	50%	161.8	157.0	161.8	157.0
Tier III mode	100%	171.2	165.2	171.2	165.2
	75%	163.4	157.8	163.4	157.8
	50%	164.1	159.3	164.1	159.3

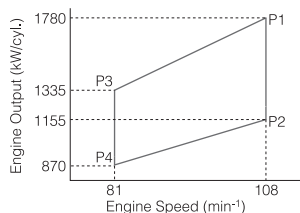
UEC50LSH-Eco-C3-HPSCR, complied with IMO Tier III
SFOC (g/kWh) with LLO+EGB

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	171.1	165.1	171.1	165.1
	75%	161.8	156.2	161.8	156.2
	50%	161.8	157.0	161.8	157.0
Tier III mode	100%	171.4	165.4	171.4	165.4
	75%	162.0	156.4	162.0	156.4
	50%	162.2	157.4	162.2	157.4

Main specifications

Cylinder bore	[mm]	500
Piston stroke	[mm]	2 300
BMEP at P1	[bar]	21.9
Piston speed at P1	[m/s]	8.3
Stroke / bore	[-]	4.60

Electronically controlled with exhaust camshaft

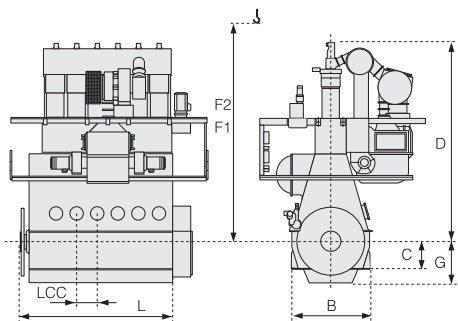


Rated power (kW), principle dimension (mm) and weight (ton)

Speed	108 min⁻¹				81 min⁻¹				Dimension	Weight
Cyl.	P1	P2	P3	P4	P1	P2	P3	P4	L	
5	8 900	5 775	6 675	4 350	5 547	194				
6	10 680	6 930	8 010	5 220	6 417	225				
7	12 460	8 085	9 345	6 090	7 287	257				
8	14 240	9 240	10 680	6 960	8 157	289				
Dimensions	LCC	B	C	D	F1	F2	G			
	870	3 350	1 190	8 448	10 050	9 140	1 700			

Tier III added weight (ton)

Cyl	5	6	7	8
EGR	9	11	12	14
LPSCR	-	-	-	-



SFOC variation

UEC50LSH-Eco-C2, complied with IMO Tier II
SFOC (g/kWh) with standard

Load	P1	P2	P3	P4
100%	168.0	162.0	168.0	162.0
75%	162.5	156.9	162.5	156.9
50%	164.0	159.2	164.0	159.2

UEC50LSH-Eco-C2, complied with IMO Tier II
SFOC (g/kWh) with LLO

Load	P1	P2	P3	P4
100%	169.6	163.6	169.6	163.6
75%	161.8	156.2	161.8	156.2
50%	162.5	157.7	162.5	157.7

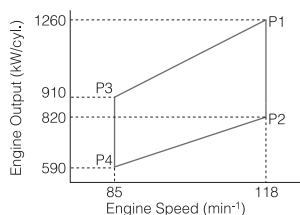
UEC50LSH-Eco-C2-LPSCR, complied with IMO Tier III
SFOC (g/kWh) with LLO

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	169.6	163.6	169.6	163.6
	75%	161.8	156.2	161.8	156.2
	50%	162.5	157.7	162.5	157.7
Tier III mode	100%	169.6	164.7	170.0	165.3
	75%	162.8	157.7	163.6	158.3
	50%	162.7	158.4	163.6	159.2

Main specifications

Cylinder bore	[mm]	420
Piston stroke	[mm]	1 930
BMEP at P1	[bar]	24.0
Piston speed at P1	[m/s]	7.6
Stroke / bore	[-]	4.60

Electronically controlled



Rated power (kW), principle dimension (mm) and weight (ton)

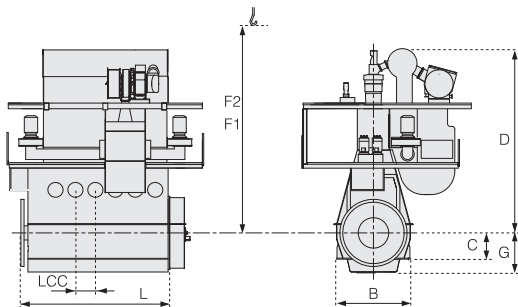
Speed	118 min ⁻¹				85 min ⁻¹				Dimension	Weight
Cyl.	P1	P2	P3	P4	P1	P2	P3	P4	L	
5	6 300	4 100	4 550	2 950	4 857	146				
6	7 560	4 920	5 460	3 540	5 617	170				
7	8 820	5 740	6 370	4 130	6 337	195				
8	10 080	6 560	7 280	4 720	7 137	219				
Dimensions	LCC	B	C	D	F1	F2	G			
	760	2 800	1 000	6 952	8 700	7 830	1 490			

Weight will be changed during development period.

Tier III added weight (ton)

Cyl	5	6	7	8
EGR	6	8	9	10
HPSCR	*	*	*	*

*: To be determined



SFOC variation

UEC42LSH-Eco-D4, complied with IMO Tier II

SFOC (g/kWh) with standard

Load	P1	P2	P3	P4
100%	166.0	160.0	166.0	160.0
75%	160.5	154.9	160.5	154.9
50%	162.0	157.2	162.0	157.2

UEC42LSH-Eco-D4, complied with IMO Tier II

SFOC (g/kWh) with LLO

Load	P1	P2	P3	P4
100%	167.6	161.6	167.6	161.6
75%	159.8	154.2	159.8	154.2
50%	160.5	155.7	160.5	155.7

UEC42LSH-Eco-D4, complied with IMO Tier II

SFOC (g/kWh) with LLO+EGB

Load	P1	P2	P3	P4
100%	169.1	163.1	169.1	163.1
75%	159.8	154.2	159.8	154.2
50%	159.8	155.0	159.8	155.0

UEC42LSH-Eco-D4-EGR, complied with IMO Tier III

SFOC (g/kWh) with LLO+EGB

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	169.1	163.1	169.1	163.1
	75%	159.8	154.2	159.8	154.2
	50%	159.8	155.0	159.8	155.0
Tier III mode	100%	169.2	163.2	169.2	163.2
	75%	161.4	155.8	161.4	155.8
	50%	162.1	157.3	162.1	157.3

UEC42LSH-Eco-D4-HPSCR, complied with IMO Tier III

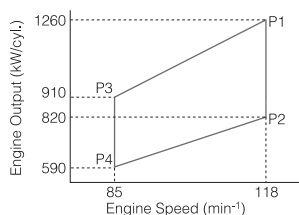
SFOC (g/kWh) with LLO+EGB

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	169.1	163.1	169.1	163.1
	75%	159.8	154.2	159.8	154.2
	50%	159.8	155.0	159.8	155.0
Tier III mode	100%	169.4	163.4	169.4	163.4
	75%	160.0	154.4	160.0	154.4
	50%	160.2	155.4	160.2	155.4

Main specifications

Cylinder bore	[mm]	420
Piston stroke	[mm]	1 930
BMEP at P1	[bar]	24.0
Piston speed at P1	[m/s]	7.6
Stroke / bore	[-]	4.60

Electronically controlled



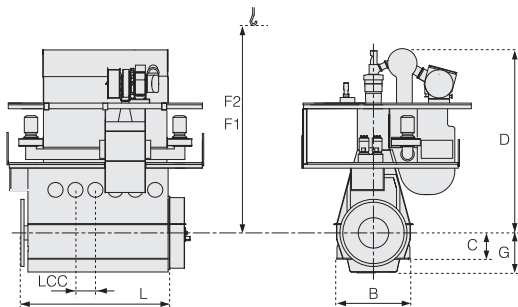
Rated power (kW), principle dimension (mm) and weight (ton)

Speed	118 min ⁻¹				85 min ⁻¹				Dimension	Weight
Cyl.	P1	P2	P3	P4	P1	P2	P3	P4	L	
5	6 300	4 100	4 550	2 950	4 857	146				
6	7 560	4 920	5 460	3 540	5 617	170				
7	8 820	5 740	6 370	4 130	6 337	195				
8	10 080	6 560	7 280	4 720	7 137	219				
Dimensions	LCC	B	C	D	F1	F2	G			
	760	2 800	1 000	6 952	8 700	7 830	1 490			

Tier III added weight (ton)

Cyl	5	6	7	8
EGR	6	8	9	10
HPSCR	*	*	*	*

*: To be determined



SFOC variation

UEC42LSH-Eco-D3, complied with IMO Tier II
SFOC (g/kWh) with standard

Load	P1	P2	P3	P4
100%	168.0	162.0	168.0	162.0
75%	162.5	156.9	162.5	156.9
50%	164.0	159.2	164.0	159.2

UEC42LSH-Eco-D3, complied with IMO Tier II
SFOC (g/kWh) with LLO

Load	P1	P2	P3	P4
100%	169.6	163.6	169.6	163.6
75%	161.8	156.2	161.8	156.2
50%	162.5	157.7	162.5	157.7

UEC42LSH-Eco-D3, complied with IMO Tier II
SFOC (g/kWh) with LLO+EGB

Load	P1	P2	P3	P4
100%	171.1	165.1	171.1	165.1
75%	161.8	156.2	161.8	156.2
50%	161.8	157.0	161.8	157.0

UEC42LSH-Eco-D3-EGR, complied with IMO Tier III
SFOC (g/kWh) with LLO+EGB

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	171.1	165.1	171.1	165.1
	75%	161.8	156.2	161.8	156.2
	50%	161.8	157.0	161.8	157.0
Tier III mode	100%	171.2	165.2	171.2	165.2
	75%	163.4	157.8	163.4	157.8
	50%	164.1	159.3	164.1	159.3

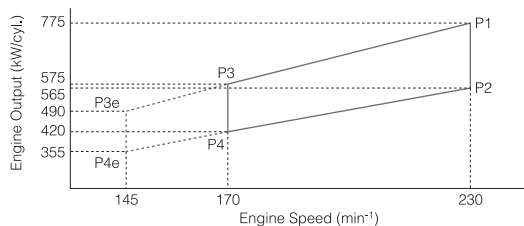
UEC42LSH-Eco-D3-HPSCR, complied with IMO Tier III
SFOC (g/kWh) with LLO+EGB

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	171.1	165.1	171.1	165.1
	75%	161.8	156.2	161.8	156.2
	50%	161.8	157.0	161.8	157.0
Tier III mode	100%	171.4	165.4	171.4	165.4
	75%	162.0	156.4	162.0	156.4
	50%	162.2	157.4	162.2	157.4

Main specifications

Cylinder bore	[mm]	330
Piston stroke	[mm]	1 050
BMEP at P1	[bar]	22.5
Piston speed at P1	[m/s]	8.1
Stroke / bore	[-]	3.18

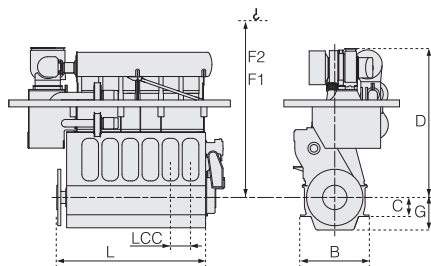
Camshaft controlled



Rated power (kW), principle dimension (mm) and weight (ton)

Speed	230 min ⁻¹		170 min ⁻¹		145 min ⁻¹		Dimension	Weight
Cyl.	P1	P2	P3	P4	P3e	P4e	L	
5	3 875	2 825	2 875	2 100	2 450	1 775	3 720	51
6	4 650	3 390	3 450	2 520	2 940	2 130	4 300	59
7	5 425	3 955	4 025	2 940	3 430	2 485	4 880	67
8	6 200	4 520	4 600	3 360	3 920	2 840	5 460	77

Dimensions	LCC	B	C	D	F1	F2	G
	580	1 980	550	4 300	5 100	4 590	940



SFOC variation

UEC33LSH-C2, complied with IMO Tier II
SFOC (g/kWh)

Load	P1	P2	P3	P4	P3e	P4e
100%	176.0	172.0	176.0	172.0	178.0	174.0
75%	171.5	167.7	171.5	167.7	173.5	169.7
50%	173.1	169.9	173.1	169.9	175.1	171.9

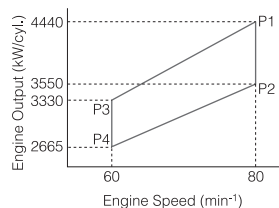
UEC33LSH-C2-LPSCR, complied with IMO Tier III
SFOC (g/kWh)

Mode	Load	P1	P2	P3	P4	P3e	P4e
Tier II mode	100%	176.0	172.0	176.0	172.0	178.0	174.0
	75%	171.5	167.7	171.5	167.7	173.5	169.7
	50%	173.1	169.9	173.1	169.9	175.1	171.9
Tier III mode	100%	176.0	172.0	176.0	172.4	178.0	174.6
	75%	171.6	168.4	172.4	168.9	174.6	171.1
	50%	173.1	169.9	173.7	170.6	175.9	172.9

Main specifications

Cylinder bore	[mm]	800
Piston stroke	[mm]	3 150
BMEP at P1	[bar]	21.0
Piston speed at P1	[m/s]	8.4
Stroke / bore	[-]	3.94

Electronically controlled



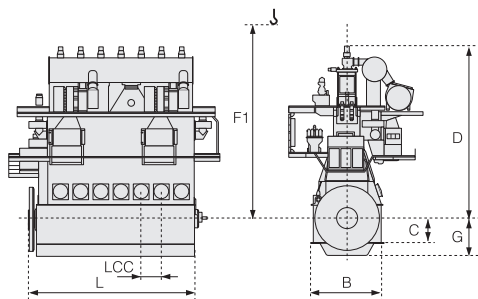
Rated power (kW), principle dimension (mm) and weight (ton)

Speed	80 min ⁻¹			60 min ⁻¹			Dimension	Weight
Cyl.	P1	P2	P3	P4	L			
5	22 200	17 750	16 650	13 325	8 658		693	
6	26 640	21 300	19 980	15 990	10 038		794	
7	31 080	24 850	23 310	18 655	11 418		895	
8	35 520	28 400	26 640	21 320	12 798		996	
Dimensions	LCC	B	C	D	F1	G		
	1 380	5 000	1 736	11 725	14 247	2 524		

Tier III added weight (ton)

Cyl	5	6	7	8
HPSCR	*	*	*	*

*: To be determined



SFOC variation

UEC80LSE-Eco-B1, complied with IMO Tier II
SFOC (g/kWh) with standard

Load	P1	P2	P3	P4
100%	167.0	163.0	167.0	163.0
75%	162.3	158.7	162.3	158.7
50%	164.1	161.6	164.1	161.6

UEC80LSE-Eco-B1, complied with IMO Tier II
SFOC (g/kWh) with LLO

Load	P1	P2	P3	P4
100%	168.6	164.6	168.6	164.6
75%	161.6	158.0	161.6	158.0
50%	162.6	160.1	162.6	160.1

UEC80LSE-Eco-B1, complied with IMO Tier II
SFOC (g/kWh) with LLO+EGB

Load	P1	P2	P3	P4
100%	170.1	166.1	170.1	166.1
75%	161.6	158.0	161.6	158.0
50%	161.9	159.4	161.9	159.4

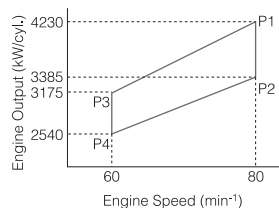
UEC80LSE-Eco-B1-HPSCR, complied with IMO Tier III
SFOC (g/kWh) with LLO+EGB

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	170.1	166.1	170.1	166.1
	75%	161.6	158.0	161.6	158.0
	50%	161.9	159.4	161.9	159.4
Tier III mode	100%	170.4	166.4	170.4	166.4
	75%	161.8	158.2	161.8	158.2
	50%	162.3	159.8	162.3	159.8

Main specifications

Cylinder bore	[mm]	800
Piston stroke	[mm]	3 150
BMEP at P1	[bar]	20.0
Piston speed at P1	[m/s]	8.4
Stroke / bore	[-]	3.94

Electronically controlled



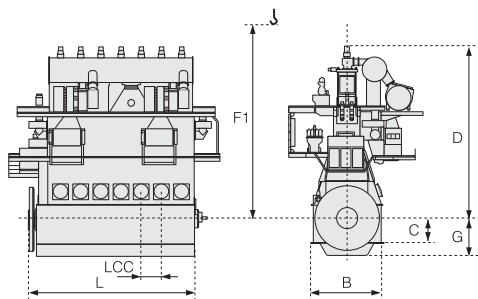
Rated power (kW), principle dimension (mm) and weight (ton)

Speed	80 min⁻¹		60 min⁻¹		Dimension	Weight
Cyl.	P1	P2	P3	P4	L	
5	21 150	16 925	15 875	12 700	8 658	693
6	25 380	20 310	19 050	15 240	10 038	794
7	29 610	23 695	22 225	17 780	11 418	895
8	33 840	27 080	25 400	20 320	12 798	996
Dimensions	LCC	B	C	D	F1	G
	1 380	5 000	1 736	11 725	14 247	2 524

Tier III added weight (ton)

Cyl	5	6	7	8
HPSCR	*	*	*	*

*: To be determined



SFOC variation

UEC80LSE-Eco-A2, complied with IMO Tier II
SFOC (g/kWh) with standard

Load	P1	P2	P3	P4
100%	167.0	163.0	167.0	163.0
75%	161.5	157.7	161.5	157.8
50%	163.0	159.8	163.0	159.8

UEC80LSE-Eco-A2, complied with IMO Tier II
SFOC (g/kWh) with LLO

Load	P1	P2	P3	P4
100%	168.6	164.6	168.6	164.6
75%	160.8	157.0	160.8	157.1
50%	161.5	158.3	161.5	158.3

UEC80LSE-Eco-A2, complied with IMO Tier II
SFOC (g/kWh) with LLO+EGB

Load	P1	P2	P3	P4
100%	170.1	166.1	170.1	166.1
75%	160.8	157.0	160.8	157.1
50%	160.8	157.6	160.8	157.6

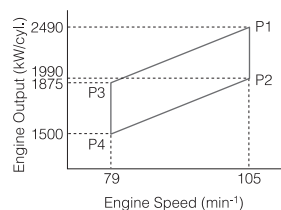
UEC80LSE-Eco-A2-HPSCR, complied with IMO Tier III
SFOC (g/kWh) with LLO+EGB

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	170.1	166.1	170.1	166.1
	75%	160.8	157.0	160.8	157.1
	50%	160.8	157.6	160.8	157.6
Tier III mode	100%	170.4	166.4	170.4	166.4
	75%	161.0	157.2	161.0	157.3
	50%	161.2	158.0	161.2	158.0

Main specifications

Cylinder bore	[mm]	600
Piston stroke	[mm]	2 400
BMEP at P1	[bar]	21.0
Piston speed at P1	[m/s]	8.4
Stroke / bore	[-]	4.00

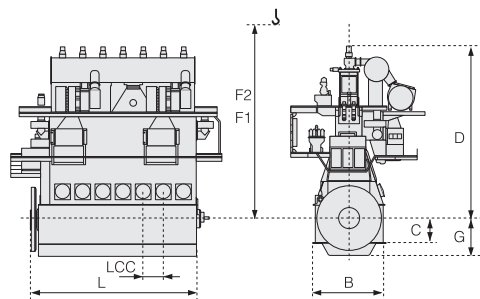
Electronically controlled



Rated power (kW), principle dimension (mm) and weight (ton)

Speed	105 min ⁻¹		79 min ⁻¹		Dimension L	Weight
Cyl.	P1	P2	P3	P4		
5	12 450	9 950	9 375	7 500	6 780	300
6	14 940	11 940	11 250	9 000	7 866	349
7	17 430	13 930	13 125	10 500	8 952	399
8	19 920	15 920	15 000	12 000	10 038	447

Dimensions	LCC	B	C	D	F1	F2	G
	1 086	3 770	1 300	8 903	10 800	10 040	1 944



SFOC variation

UEC60LSE-Eco-B1, complied with IMO Tier II
SFOC (g/kWh) with standard

Load	P1	P2	P3	P4
100%	170.0	166.0	170.0	166.0
75%	165.3	161.6	165.3	161.7
50%	167.1	164.6	167.1	164.6

UEC60LSE-Eco-B1, complied with IMO Tier II
SFOC (g/kWh) with LLO

Load	P1	P2	P3	P4
100%	171.6	167.6	171.6	167.6
75%	164.6	160.9	164.6	161.0
50%	165.6	163.1	165.6	163.1

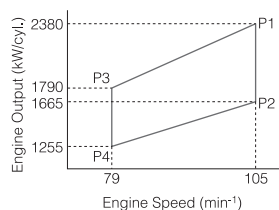
UEC60LSE-Eco-B1-LPSCR, complied with IMO Tier III
SFOC (g/kWh) with LLO

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	171.6	167.6	171.6	167.6
	75%	164.6	160.9	164.6	161.0
	50%	165.6	163.1	165.6	163.1
Tier III mode	100%	172.0	168.8	172.8	169.4
	75%	165.8	162.4	166.6	163.2
	50%	165.8	163.7	166.8	164.6

Main specifications

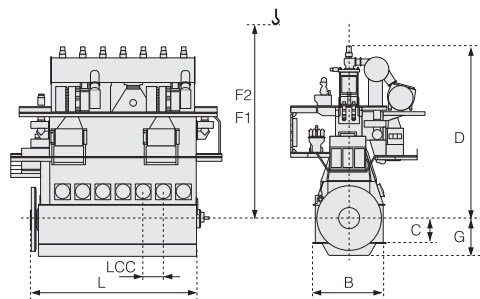
Cylinder bore	[mm]	600
Piston stroke	[mm]	2 400
BMEP at P1	[bar]	20.0
Piston speed at P1	[m/s]	8.4
Stroke / bore	[-]	4.00

Electronically controlled



Rated power (kW), principle dimension (mm) and weight (ton)

Speed	105 min ⁻¹			79 min ⁻¹			Dimension L	Weight
Cyl.	P1	P2	P3	P4				
5	11 900	8 325	8 950	6 275	6 780	300		
6	14 280	9 990	10 740	7 530	7 866	349		
7	16 660	11 655	12 530	8 785	8 952	399		
8	19 040	13 320	14 320	10 040	10 038	447		
Dimensions	LCC	B	C	D	F1	F2	G	
	1 086	3 770	1 300	8 903	10 800	10 040	1 944	



SFOC variation

UEC60LSE-Eco-A2, complied with IMO Tier II
SFOC (g/kWh) with standard

Load	P1	P2	P3	P4
100%	170.0	164.0	170.0	164.0
75%	164.5	158.9	164.5	158.9
50%	166.0	161.2	166.0	161.2

UEC60LSE-Eco-A2, complied with IMO Tier II
SFOC (g/kWh) with LLO

Load	P1	P2	P3	P4
100%	171.6	165.6	171.6	165.6
75%	163.8	158.2	163.8	158.2
50%	164.5	159.7	164.5	159.7

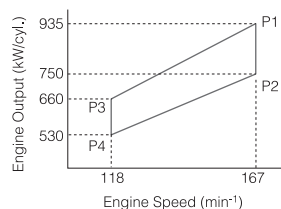
UEC60LSE-Eco-A2-LPSCR, complied with IMO Tier III
SFOC (g/kWh) with LLO

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	171.6	165.6	171.6	165.6
	75%	163.8	158.2	163.8	158.2
	50%	164.5	159.7	164.5	159.7
Tier III mode	100%	172.0	167.1	172.8	167.7
	75%	165.0	159.7	165.8	160.4
	50%	164.7	160.3	165.7	161.1

Main specifications

Cylinder bore	[mm]	350
Piston stroke	[mm]	1 550
BMEP at P1	[bar]	22.5
Piston speed at P1	[m/s]	8.6
Stroke / bore	[-]	4.43

Electronically controlled



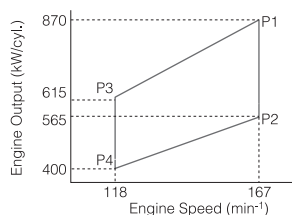
Rated power (kW), principle dimension (mm) and weight (ton)

Speed	167 min ⁻¹				118 min ⁻¹				Dimension L	Weight
Cyl.	P1	P2	P3	P4	P1	P2	P3	P4		
5	4 675	3 750	3 300	2 650	4 398	79	(81)			
6	5 610	4 500	3 960	3 180	5 010	88	(90)			
7	6 545	5 250	4 620	3 710	5 622	98	(101)			
8	7 480	6 000	5 280	4 240	6 234	109	(112)			
Dimensions	LCC	B	C	D	F1	G				
	612	2 284	830	5 623	6 725	1 326				

Main specifications

Cylinder bore	[mm]	350
Piston stroke	[mm]	1 550
BMEP at P1	[bar]	21.0
Piston speed at P1	[m/s]	8.6
Stroke / bore	[-]	4.43

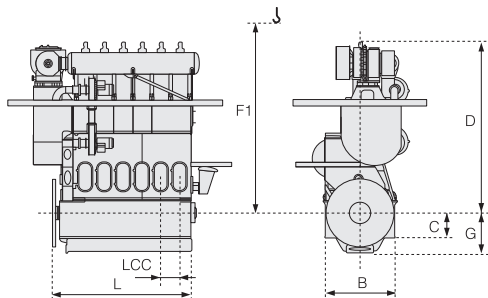
Electronically controlled



Rated power (kW), principle dimension (mm) and weight (ton)

Speed	167 min ⁻¹				118 min ⁻¹				Dimension	Weight
Cyl.	P1	P2	P3	P4	P1	P2	P3	P4	L	
5	4 350	2 825	3 075	2 000	4 398	79	(81)			
6	5 220	3 390	3 690	2 400	5 010	88	(90)			
7	6 090	3 955	4 305	2 800	5 622	98	(101)			
8	6 960	4 520	4 920	3 200	6 234	109	(112)			
Dimensions	LCC	B	C	D	F1	G				
	612	2 284	830	5 623	6 725	1 326				

Weight in () is for engine of bedplate, made by cast iron.



SFOC variation

UEC35LSE-Eco-B2, complied with IMO Tier II
SFOC (g/kWh) with standard

Load	P1	P2	P3	P4
100%	171.0	165.0	171.0	165.0
75%	165.5	159.9	165.5	159.9
50%	167.0	162.2	167.0	162.2

UEC35LSE-Eco-B2, complied with IMO Tier II
SFOC (g/kWh) with LLO

Load	P1	P2	P3	P4
100%	172.6	166.6	172.6	166.6
75%	164.8	159.2	164.8	159.2
50%	165.5	160.7	165.5	160.7

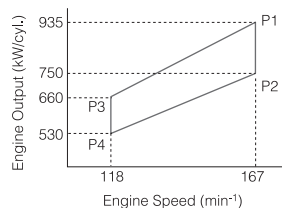
UEC35LSE-Eco-B2-LPSCR, complied with IMO Tier III
SFOC (g/kWh) with LLO

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	172.6	166.6	172.6	166.6
	75%	164.8	159.2	164.8	159.2
	50%	165.5	160.7	165.5	160.7
Tier III mode	100%	172.6	167.4	172.6	167.9
	75%	165.6	160.3	166.3	160.9
	50%	165.7	161.1	166.6	161.8

Main specifications

Cylinder bore	[mm]	350
Piston stroke	[mm]	1 550
BMEP at P1	[bar]	22.5
Piston speed at P1	[m/s]	8.6
Stroke / bore	[-]	4.43

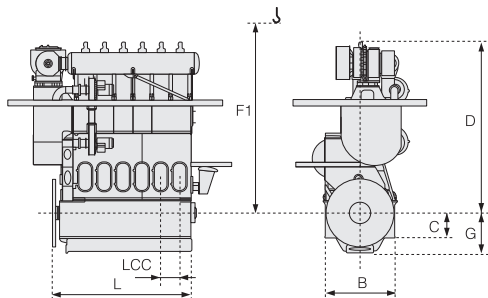
Camshaft controlled



Rated power (kW), principle dimension (mm) and weight (ton)

Speed	167 min⁻¹		118 min⁻¹		Dimension	Weight
Cyl.	P1	P2	P3	P4	L	
5	4 675	3 750	3 300	2 650	4 398	80 (82)
6	5 610	4 500	3 960	3 180	5 010	89 (91)
7	6 545	5 250	4 620	3 710	5 622	98 (101)
8	7 480	6 000	5 280	4 240	6 234	108 (111)
Dimensions	LCC	B	C	D	F1	G
	612	2 284	830	5 623	6 725	1 326

Weight in () is for engine of bedplate, made by cast iron.



SFOC variation

UEC35LSE-C1, complied with IMO Tier II
SFOC (g/kWh)

Load	P1	P2	P3	P4
100%	175.0	171.0	175.0	171.0
75%	171.1	167.5	171.1	167.5
50%	172.4	169.9	172.4	169.9

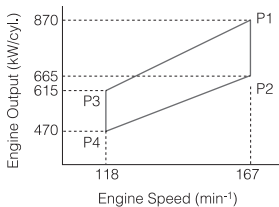
UEC35LSE-C1-LPSCR, complied with IMO Tier III
SFOC (g/kWh)

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	175.0	171.0	175.0	171.0
	75%	171.1	167.5	171.1	167.5
	50%	172.4	169.9	172.4	169.9
Tier III mode	100%	175.0	171.0	175.0	171.0
	75%	171.7	168.4	172.5	169.1
	50%	172.4	170.3	173.5	171.2

Main specifications

Cylinder bore	[mm]	350
Piston stroke	[mm]	1 550
BMEP at P1	[bar]	21.0
Piston speed at P1	[m/s]	8.6
Stroke / bore	[-]	4.43

Camshaft controlled



Rated power (kW), principle dimension (mm) and weight (ton)

Speed	167 min ⁻¹				118 min ⁻¹		Dimension L	Weight
Cyl.	P1	P2	P3	P4	P3	P4		
5	4 350	3 325	3 075	2 350	4 398	80 (82)		
6	5 220	3 990	3 690	2 820	5 010	89 (91)		
7	6 090	4 655	4 305	3 290	5 622	98 (101)		
8	6 960	5 320	4 920	3 760	6 234	108 (111)		
Dimensions	LCC	B	C	D	F1	G		
	612	2 284	830	5 623	6 725	1 326		

Weight in () is for engine of bedplate, made by cast iron.

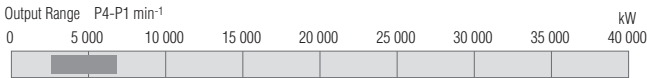
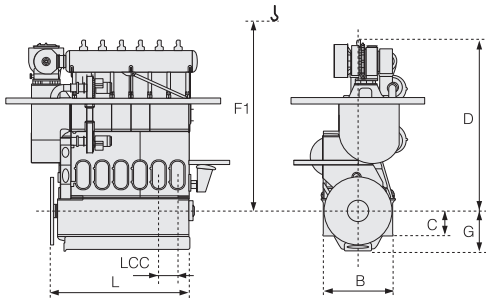
SFOC variation

UEC35LSE-B2, complied with IMO Tier II
SFOC (g/kWh)

Load	P1	P2	P3	P4
100%	174.0	170.0	174.0	170.0
75%	169.5	165.7	169.5	165.7
50%	171.1	167.9	171.1	167.9

UEC35LSE-B2-LPSCR, complied with IMO Tier III
SFOC (g/kWh)

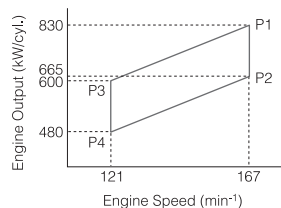
Mode	Load	P1	P2	P3	P4
Tier II mode	100%	174.0	170.0	174.0	170.0
	75%	169.5	165.7	169.5	165.7
	50%	171.1	167.9	171.1	167.9
Tier III mode	100%	174.0	170.4	174.0	171.0
	75%	170.2	166.8	171.0	167.4
	50%	171.3	168.4	172.3	169.2



Main specifications

Cylinder bore	[mm]	330
Piston stroke	[mm]	1 550
BMEP at P1	[bar]	22.5
Piston speed at P1	[m/s]	8.6
Stroke / bore	[-]	4.70

Camshaft controlled



Rated power (kW), principle dimension (mm) and weight (ton)

Speed	167 min⁻¹				121 min⁻¹		Dimension	Weight
Cyl.	P1	P2	P3	P4	P1	P2	L	
5	4 150	3 325	3 000	2 400	4 398	79 (81)		
6	4 980	3 990	3 600	2 880	5 010	88 (90)		
7	5 810	4 655	4 200	3 360	5 622	97 (100)		
8	6 640	5 320	4 800	3 840	6 234	107 (110)		
Dimensions	LCC	B	C	D	F1	G		
	612	2 284	830	5 576	6 725	1 326		

Weight in () is for engine of bedplate, made by cast iron.

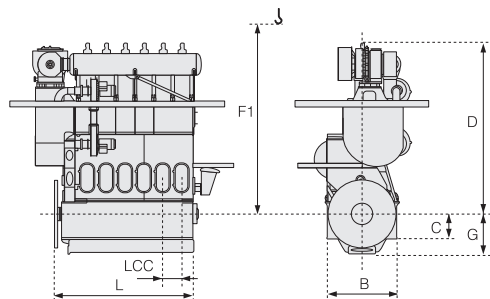
SFOC variation

UEC33LSE-C2, complied with IMO Tier II
SFOC (g/kWh)

Load	P1	P2	P3	P4
100%	175.0	171.0	175.0	171.0
75%	170.5	166.8	170.5	166.7
50%	172.1	168.9	172.1	168.9

UEC33LSE-C2-LPSCR, complied with IMO Tier III
SFOC (g/kWh)

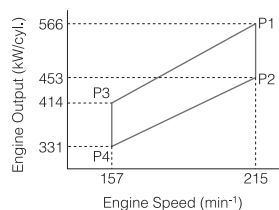
Mode	Load	P1	P2	P3	P4
Tier II mode	100%	175.0	171.0	175.0	171.0
	75%	170.5	166.8	170.5	166.7
	50%	172.1	168.9	172.1	168.9
Tier III mode	100%	175.0	171.0	175.0	171.0
	75%	170.9	167.5	171.5	168.0
	50%	172.1	169.0	172.9	169.8



Main specifications

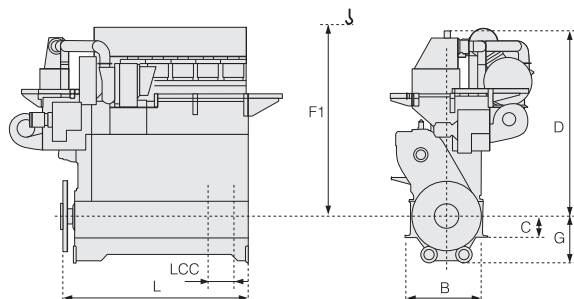
Cylinder bore	[mm]	330
Piston stroke	[mm]	1 050
BMEP at P1	[bar]	17.6
Piston speed at P1	[m/s]	7.5
Stroke / bore	[-]	3.18

Electronically controlled



Rated power (kW), principle dimension (mm) and weight (ton)

Speed	215 min ⁻¹		157 min ⁻¹		Dimension	Weight
Cyl.	P1	P2	P3	P4	L	
5	2 830	2 265	2 070	1 655	3 765	57
6	3 400	2 720	2 480	1 985	4 345	65
7	3 965	3 170	2 895	2 315	4 925	73
8	4 530	3 625	3 310	2 645	5 505	83
Dimensions	LCC	B	C	D	F1	G
	580	1 900	500	4 301	5 150	906



SFOC variation

UEC33LSII-Eco, complied with IMO Tier II
SFOC (g/kWh) with standard

Load	P1	P2	P3	P4
100%	176.0	172.0	176.0	172.0
75%	171.3	167.7	171.3	167.7
50%	173.1	170.6	173.1	170.6

UEC33LSII-Eco, complied with IMO Tier II
SFOC (g/kWh) with LLO

Load	P1	P2	P3	P4
100%	177.6	173.6	177.6	173.6
75%	170.6	167.0	170.6	167.0
50%	171.6	169.1	171.6	169.1

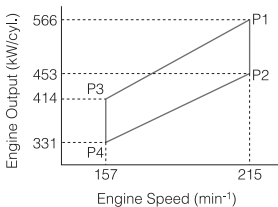
UEC33LSII-Eco-LPSCR, complied with IMO Tier III
SFOC (g/kWh) with LLO

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	177.6	173.6	177.6	173.6
	75%	170.6	167.0	170.6	167.0
	50%	171.6	169.1	171.6	169.1
Tier III mode	100%	177.7	174.2	178.5	174.8
	75%	170.7	167.1	171.5	167.9
	50%	171.9	169.1	171.7	169.2

Main specifications

Cylinder bore	[mm]	330
Piston stroke	[mm]	1 050
BMEP at P1	[bar]	17.6
Piston speed at P1	[m/s]	7.5
Stroke / bore	[-]	3.18

Camshaft controlled



Rated power (kW), principle dimension (mm) and weight (ton)

Speed	215 min ⁻¹		157 min ⁻¹		Dimension	Weight
Cyl.	P1	P2	P3	P4	L	
5	2 830	2 265	2 070	1 655	3 765	52
6	3 400	2 720	2 480	1 985	4 345	60
7	3 965	3 170	2 895	2 315	4 925	68
8	4 530	3 625	3 310	2 645	5 505	78
Dimensions	LCC	B	C	D	F1	G
	580	1 900	500	4 301	5 150	906

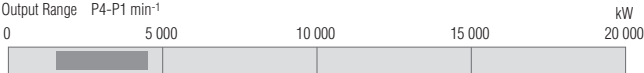
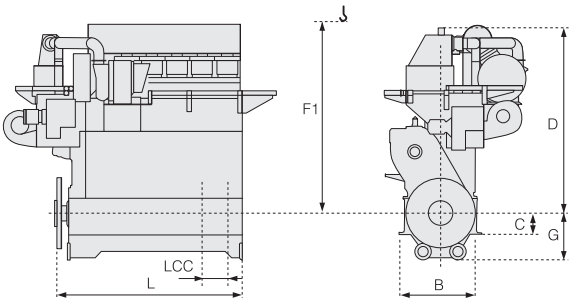
SFOC variation

UEC33LSII, complied with IMO Tier II
SFOC (g/kWh)

Load	P1	P2	P3	P4
100%	183.0	179.0	183.0	179.0
75%	179.1	175.5	179.1	175.5
50%	180.4	177.9	180.4	177.9

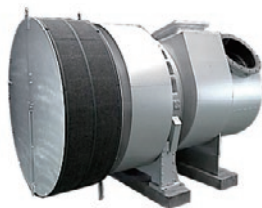
UEC33LSII-LPSCR, complied with IMO Tier III
SFOC (g/kWh)

Mode	Load	P1	P2	P3	P4
Tier II mode	100%	183.0	179.0	183.0	179.0
	75%	179.1	175.5	179.1	175.5
	50%	180.4	177.9	180.4	177.9
Tier III mode	100%	183.0	179.4	183.8	180.1
	75%	179.1	175.5	179.9	176.3
	50%	180.4	177.9	180.4	177.9



METurbo

Global standard exhaust gas turbochargers used widely for marine and stationary engines.



Features

- Applicable to all major engines (MAN ES, WinGD and J-ENG)
- Advanced aerodynamic design based on numerous tests and analysis results
- Long lifetime and High reliability
- Low noise silencer application
- Simple and compact
- High robustness of bearing pedestal type structure

Integrated EGB Turbochargers

Ordinary, exhaust bypass line has been installed between exhaust gas receiver and exhaust gas duct of the engine.

Integrated EGB enables to bypass the exhaust gas by integrating the bypass pipe and open/close valve on turbocharger in between gas inlet casing and outlet gas casing.

Integrated EGB is also available by retrofitting from standard MET turbocharger by just changing several parts. Also, this system could be applicable to temperature increment procedure at 2-stroke engine with Low Pressure SCR system.

Features

- Connected directly to turbocharger
- No EGB pipe (engine side)

**Also Available
for Retrofitting**



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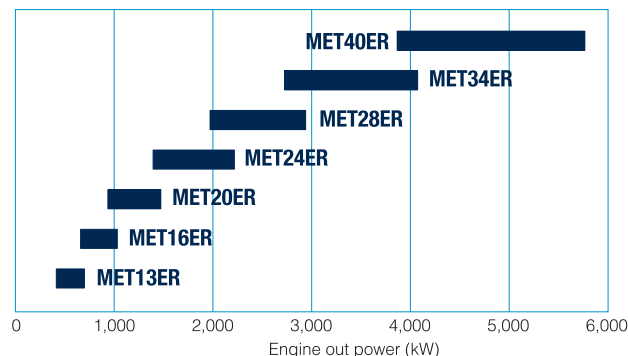
MET-ER Series

MET-ER Series, a new type of radial turbocharger succeed the high reliability and maintainability of MET-SRC series. This new turbocharger has improved its responsiveness and reduces the number of parts to achieve a more compact design and high maintainability.

MET-ER Series has been developed based on high pressure ratio requirements for turbochargers, in order to improve the performance of and reduce the NOx emissions of engines.

Features

- MET-ER takes advantage of MET-SCR features
- Compact design (about 40%)
- Optimized to engine power range
- Applicable to high pressure ratio
- Reduced number of parts by 30%
- Excellent performance and better transient response



MET-SRC Series

Developed to meet the demand for higher performance and reliability, well proven by the excellent service records of axial type MET turbochargers.



Features

- Applicable to high pressure ratio
- Non-water cooling
- Easy overhaul
- Crew-maintainable design
- Condition based maintenance
- High reliability
- High efficiency
- Applicable to heavy fuel oil

Type		MET18SRC	MET22SRC		MET26SRC	MET30SRC	MET37SRC
Max. Pressure Ratio	—	5.5			5.5		
Engine Output Range per Turbocharger	kW	400 - 1,100	650 - 1,600		850 - 2,200	1,150 - 3,300	2,000 - 4,400
Maximum Continuous Gas Temperature before Turbine	°C	610					
Momentary Maximum Temperature before Turbine	°C	640					
Length	mm	712	835		1,075	1,368	1,661
Breadth	mm	510	605		735	860	1,070
Height	mm	510	605		735	860	1,070

* Engine Output Range is the reference values subject to pressure ratio 3.5.

METurbo

MET-MBII Series

MET-MBII Series, a new type of axial turbocharger for achieving a further increase in air flow volume while maintaining the reliability and ease of maintenance of the MET-MB turbocharger.

The MBII turbocharger provides 16% larger air flow volume than the MET-MB Series, which leads one or two models more compact compared to previous models.

Features

- MET-MBII takes advantage of MET-MB features
- Increased air-flow rate by 16%
- Downsizing by increasing air flow



Type		MET33MBII	MET37MBII	MET42MBII	MET48MBII		MET53MBII	MET60MBII	MET66MBII	MET71MBII	MET83MBII
Max. Pressure Ratio	—	5.0					5.0				
Engine Output Range per Turbocharger	kW	3,400-6,000	4,600-7,600	5,600-9,300	7,200-11,900		9,000-14,900	11,200-18,400	14,000-23,100	16,400-27,100	22,500-37,100
Maximum Continuous Gas Temperature before Turbine	°C	580					580				
Momentary Maximum Temperature before Turbine	°C	610					610				
Length	mm	1,870	2,080	2,190	2,400		2,610	2,960	3,200	3,290	3,940
Breadth	mm	899	998	1,094	1,255		1,390	1,530	1,718	1,820	2,233
Height	mm	945	1,095	1,171	1,330		1,439	1,570	1,780	1,865	2,225

* Engine Output Range is the reference values subject to pressure ratio 4.0.

MET-MB Series

Global standard turbochargers for marine and stationary engines for J-ENG, WinGD and MAN Energy Solutions.

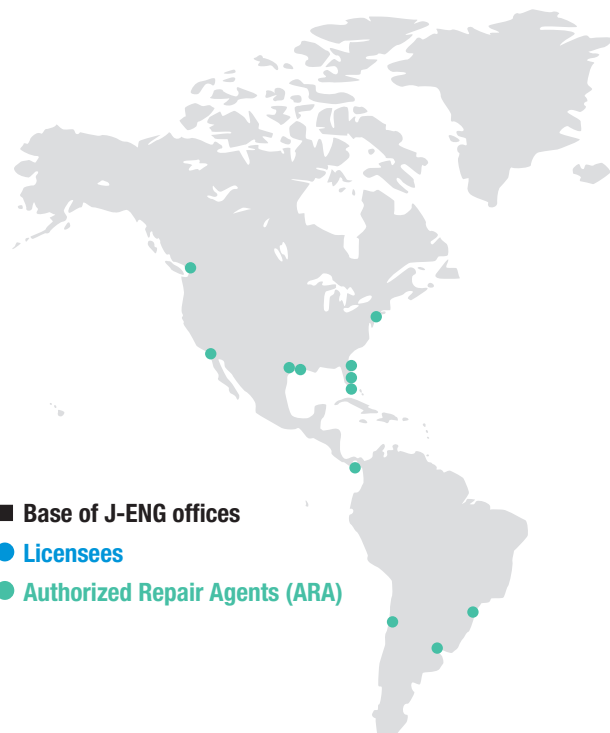
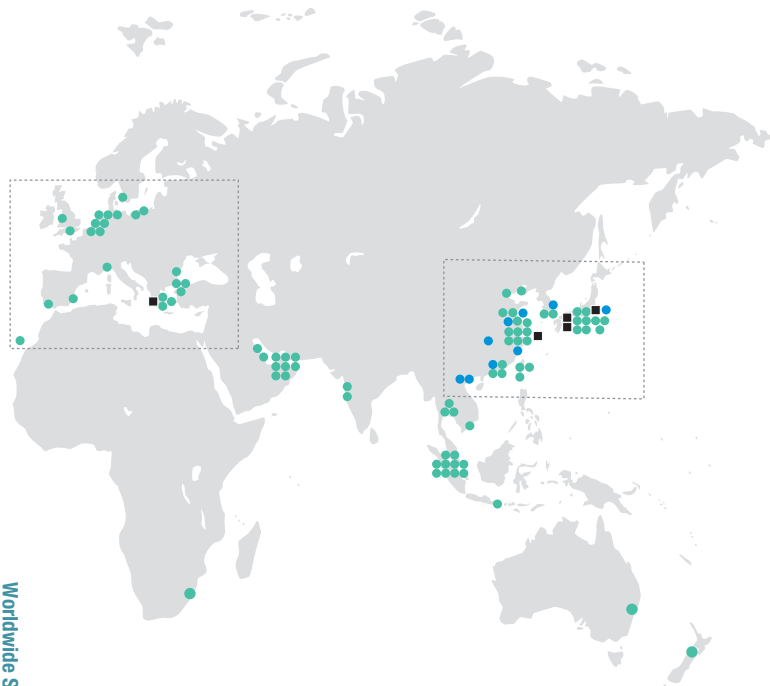
Features

- Applicable to all major engines (J-ENG, WinGD, MAN ES)
- Advanced aerodynamic design based on numerous tests and analysis results
- Easy overhaul
- Crew-maintainable design
- Condition based maintenance
- High reliability
- High efficiency
- Applicable to heavy fuel oil

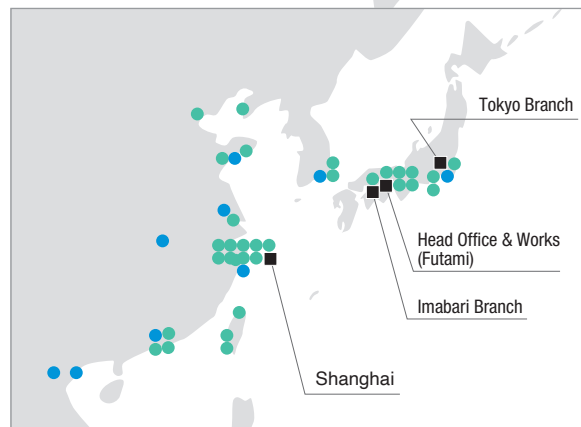
Type		MET33MB	MET37MB	MET42MB	MET48MB		MET53MB	MET60MB	MET66MB	MET71MB	MET83MB	MET90MB
Max. Pressure Ratio	—	5.0					5.0					
Engine Output Range per Turbocharger	kW	2,600 -4,600	3,800 -6,300	4,700 -7,700	6,000 -10,000		7,500 -12,500	9,300 -15,500	11,700 -19,400	13,700 -22,700	18,800 -31,100	22,900 -37,900
Maximum Continuous Gas Temperature before Turbine	°C	580					580					
Momentary Maximum Temperature before Turbine	°C	610					610					
Length	mm	1,661	1,851	1,944	2,280		2,504	2,825	3,065	3,143	3,771	4,241
Breadth	mm	899	998	1,134	1,255		1,417	1,530	1,785	1,820	2,233	2,465
Height	mm	945	1,095	1,155	1,330		1,435	1,540	1,720	1,865	2,180	2,410

* Engine Output Range is the reference values subject to pressure ratio 4.0.

Worldwide Service Network



- Base of J-ENG offices
- Licensees
- Authorized Repair Agents (ARA)



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