Guascor Energy

Guascor Energy
Diesel & Gas Engines

Marine

guascor-energy.com

Contents

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1.1 Power Definition

Guascor Energy diesel engines ratings stated in this document are based on ISO3046-1:2002(E), ISO3046-3:2006(E) and ISO15550:2002(E) standards.
These ratings have been measured (including all engine driven mechanical pumps).

Abbreviations ICFN / IFN power

I = ISO Standard (3046)

C = Continuous

F = Fuel stop

N = Net power

Our Guascor Energy diesel engines are designed following the reference conditions. On vessels approved and/or surveyed by IACS members, "standard design conditions" are to be observed.

Standard reference conditions ISO 15550:2002

- Total barometric pressure: 100 kPa / 1.000 mbar
- Air temperature: 25ºC (77ºF) / 298 K
- Relative humidity: 30%
- Charge air coolant (raw): 25ºC (77ºF) / 298 K
- Charge air coolant (treated): 29ºC (84ºF) / 302 K

Standard design conditions ISO 3046-1:2002 & 3046-3:2006

- Total barometric pressure: 100 kPa / 1.000 mbar
- Air temperature: 45ºC (113ºF) / 318 K
- Relative humidity: 60%
- Charge air coolant (raw): 32ºC (89ºF) / 305 K
- Charge air coolant (treated): 36ºC (96ºF) / 309 K

1.2 Rating Definitions

Propulsion

A - Rating (unrestricted continuous duty)

Rated power intended for continuous use in applications requiring uninterrupted service with high load factors; this is an ISO standard (continuous) fuel stop power (ICFN).

Typical load factors: 80-100% of rated power

Full load operation time: 100% of time or 24/24h

Operation time: 5.000 - 8.000 h/year

Operation type: Displacement hull vessels for unrestricted use at full speed and load

Typical applications: Fishing trawlers, bottom trawlers, freighters, ankers, tow & push boats, long distance ferries, dredgers, cabin cruiser, research vessels

B - Rating (variable continuous duty)

Rated power intended for use in variable load applications, medium-high load factors; this is an ISO 3046 fuel stop power (IFN).

Typical load factors: 40-80% of rated power

Full load operation time: 80% of time or 10/12h

Operation time: 3.000 – 5.000 h/year

Hull type: Semi-planning or semi-displacement hulls for restricted use at full load

Typical applications: Mid-water trawlers, fishing long liners, purse seiners, harbour tow & push boats, passenger cruiser, tugboats, short distance ferries

C - Rating (intermittent duty)

Power intended for use in variable load applications with moderate load factors. This is an ISO 3046 fuel stop power (IFN)

Typical load factors: 20-80% of rated power

Full load operation time: 50% of time or 6/12h

Operation time: 1.500 – 3.000 h/year

Hull type: Semi-planning or planning hulls, fast commercial and passenger vessels for restricted use with moderate load factors and high demands on vessel's speed

Typical applications: Passenger boats, high-speed fishing boats, crew and service boats, moto-pumps, pilot boats

Diesel Electric Propulsion

COP (continuous power)

Rated power (ISO8528) intended for continuous use in applications requiring uninterrupted service with high load factors for an unlimited number of hours per year; 10% overload available in a period of time of 1/12 operation hours and maximum 25 h/year

Typical load factors: < 80% of rated power 100% of time or 24/24h

Full load operation time: 110% overload available

Overload: 1/12h and max. 25 h/year

Operation time: 5.000 - 8.000 h/year

Typical applications: Ferries, research vessels, passenger cruiser, tugboats, offshore vessels, freighters, and tankers

Auxiliary and Generator Set

COP (continuous power)

Engines with this rating (ISO 8528) are available for supplying utility power at a constant 100% load for an unlimited number of hours per year. A 10% overload capability for a period of time of 1/12 operation hours and maximum 25 h/year is additionally allowed to that specified on ISO 8528.

Typical load factors: 80-100% of rated power

Full load operation time: 100% of time or 24/24h ·

Overload: 110% overload available 1/12h and max. 25 h/year

Operation time: 5.000 - 8.000 h/year

1.3. Fuel Consumption

The fuel consumption values published in this document have been calculated according to ISO8178 standard test cycles. These values must be considered as indicative guidance but not considered absolute values. Fuel consumption may vary as it can be influenced by external factors such as ship application, different environmental conditions, particular propeller design, hull form, etc.

ISO 8178 test cycles and weighting factors

C1 Test Cycle: Auxiliary engines at variable speed

Mode Number	1	2	3	4	5	6	7	8
% Speed	100%				Intermediate			Idle
% Torque	100	75	50	10	100	75	50	0
Weight Factor	0.15	0.15	0.15	0.1	0.1	0.1	0.1	0.15

D2 Test Cycle: Auxiliary engines at a constant speed

Mode Number	1	2	3	4	5
% Speed	100	100	100	100	100
% Power	100	75	50	25	10
Weight Factor	0.05	0.25	0.30	0.30	0.10

E2 Test Cycle: Main propulsion engines at a constant speed

Mode Number	1	2	3	4	5
% Speed	100	100	100	100	-
% Power	100	75	50	25	-
Weight Factor	0.20	0.50	0.15	0.15	-

E3 Test Cycle: Main propulsion and auxiliary engines adapted to propeller demand

Mode Number	1	2	3	4	5
% Speed	100	91	80	63	-
% Power	100	75	50	25	-
Weight Factor	0.2	0.5	0.15	0.15	-

Fuel consumption rates are based on ISO3046-1 with a tolerance of +5% and is based on diesel gasoil B with LHV 42.700 KJ/kg (18.358 Btu/lb) when used at 29°C (85°F) and weighing 836 g/liter (6.977 lb/US gal)

Extensions of this information should be compared with the specifications indicated in the mentioned standards.

1.4 Emission Certifications

IMO (International Maritime Organization)

On January 1, 2000, annex VI of MARPOL 73 / 78 went into effect for all marine diesel engines above 130 kW / 177 HP installed on vessels whose keel is laid after January 1 and which do not operate exclusively in national waters. Current revision (Tier II) entered into force from January 1, 2011.

The Tier III, in force since January 1, 2016, applies only to the specified ships while operating in Emission Control Areas (ECA) established to limit NOx emissions, outside such areas the Tier II controls apply.

- IMO applies to sea going vessels
- IMO applies on engines rated above 130 kW / 177 mHP
- Emergency on-board engines are exempt to accomplish IMO regulations

IMO Tier III includes proprietary SCR Design.

CCNR (Central Commission for the Navigation on the Rhine)

Effective January 1, 2003, the CCNR regulates exhaust emissions limits for all marine diesel engines above 37kW / 50HP installed on inland waterway- going vessels running through the Rhine or its tributary rivers. Members of the CCNR include Belgium, Netherlands, Germany, France, Luxembourg, and Switzerland. Current revision (CCNR II) entered into force effective January 1, 2007.

- CCNR rules apply to inland waterway-going vessels
- Applies on engines rated above 37 kW / 50 mHP
- Equivalent to EU directive for non-road mobile machinery 97 / 68 / EC, as amended by directive 2004 / 26/EC, mutual recognition agreement effective July 1, 2007

1.5 Marine Classification Societies

Guascor Energy marine engines, gen-sets and gear boxes are designed and built according to the rules of major marine classification societies worldwide. Approvals from major marine classification societies worldwide include:

- **ABS** American Bureau of Shipping
- **BV** Bureau Veritas
- **LR** Lloyds Register

Some marine products or ratings may differ depending upon class society.

For more information on emission or marine classification society certifications, please contact your local Guascor Energy sales representative.

1.6 Abbreviations

This document contents the following abbreviations which will appear on subsequent pages to identify the emission regulation compliance of each engine type and/or rating.

N.C.	Not compliant or not applicable
N.A.	Not applicable
IMO I	IMO Tier I compliant (see IMO II) EIAPP certificates available for engine replacement only for all diesel engines placed on a vessel before December 31, 2010
IMO II	IMO Tier II compliant, EIAPP certificates available
IMO III	IMO Tier III compliant, EIAPP certificates available
CCNR2	CCNR Stage II compliant
DEP	Diesel electric propulsion
COP	Continuous power
mHP	Metric horsepower (DIN)
kW	Kilowatt
kVA	Kilovolt amper

1.6 Marine Product Summary

Propulsion Engines

kWb	HP	RPM	Type	Rating	Page
184	250	1.800	F180TA	A	19
380	515	1.400	SF180TA		
412	560	1.600			
434	590	1.800			
441	600				
478	650	1.800	F240TA		20
484	660	1.400	SF240TA		
552	750	1.600			
577	785	1.800			
588	800				
760	1.034	1.400	SF360TA		21
824	1.120	1.600			
868	1.180	1.800			
882	1.200				
882	1.200				
968	1.270	1.400	SF480TA		22
1.103	1.500	1.600			
1.177	1.600	1.800			
191	260	1.800	F180	B	19
353	480		F180TA		
382	520		SF180TA		
404	550	1.400			
474	645	1.800			
493	670	1.800	F240TA		20
635	864		SF240TA		
706	960		F360TA		21
810	1.100	1.400	SF360TA		
949	1.290	1.800			
993	1.350		F480TA		22
1.268	1.725		SF480TA		
404	550	1.800	F180TA	C	19
504	685		SF180TA		
552	750				
662	900		SF240TA		20
1.000	1.360		SF360TA		21
1.029	1.400		F480TA		22
1.324	1.800		SF480TA		

Auxiliary Engines Variable Speed Speed

kWb	HP	RPM	Type	Rating	Page
184	250	1.800	F180	A	33
380	515	1.400	SF180TA		
412	560	1.600			
434	590	1.800			
441	600				
478	650	1.800	F240TA		34
484	660	1.400	SF240TA		
552	750	1.600			
577	785	1.800			
588	800				
760	1.034	1.400	SF360TA		35
824	1.120	1.600			
868	1.180	1.800			
882	1.200				
968	1.270	1.400	SF480TA		36
1.103	1.500	1.600			
1.177	1.600	1.800			
191	260	1.800	F180	B	33
353	480		F180TA		
382	520		SF180TA		
405	550	1.400	SF180TA		
474	645	1.800	SF180TA		
493	670	1.800	F240TA		34
635	864		SF240TA		
706	480	1.800	F360TA		35
810	520	1.400	SF360TA		
949	550	1.800			
993	1.350	1.800	F480TA		36
1.268	1.724		SF480TA		
404	549	1.800	F180TA	C	33
504	685		SF180TA		
662	900	1.800	SF240TA		34
1000	1.360	1.800	SF360TA		35
1.029	1.400	1.800	F480TA		36
1.324	1.800		SF480TA		

Gearboxes

Gear box type	Reduction Ratio	Power		Rating	RPM	Page
		kWb	mHP			
R-160	1,53 – 4,91	294	400	A	1.800	25
		324	440	B		
R-240	2,9 – 4,95	515	700	A	1.800	26
		566	770	B		
R-240E	3,56 – 6,08	441	600	A		27
		485	660	B		
R-360	2,04 – 6,00	662	900	A	1.800	28
		728	990	B		
R-360E	7,2	515	700	A		29
		566	770	B		
	8,9	441	770	A		
		485	660	B		
R-500	2,7 – 7,03	1.228	1.670	A	1.800	30
		1.351	1.837	B		

Marine Power Generation Engines

kWb	HP	RPM	Type	Rating	Page
294	400	1.500	F180TA	A	39
383	520		SF180TA		
396	540				
421	573				
346	470	1.800	F180TA	A	
434	590		SF180TA		
441	600				
426	579	1.500	F240TA	A	40
510	694		SF240TA		
540	734				
478	650	1.800	F240TA	A	
577	785		SF240TA		
588	800				
588	800	1.500	F360TA	A	41
765	1.040		SF360TA		
800	1.088				
840	1.142				
699	950	1.800	F360TA		
866	1.178		SF360TA		
883	1.200				
846	1.150	1.500	F480TA	A	42
1.020	1.388		SF480TA		
1.050	1.428				
934	1.270	1.800	F480TA		
1.155	1.571		SF480TA		
1.177	1.600				

Marine Power Generation Sets

kVA	kWe	Hz	Type	Rating	Page
345	276	50	F180TA	COP	45
400	320		SF180TA		
460	368				
400	320	60	F180TA		
440	352		SF180TA		
520	416				
500	400	50	F240TA	COP	46
600	480		SF240TA		
640	512				
600	480	60	F240TA		
650	520		SF240TA		
690	552				
700	560	50	F360TA	COP	47
860	688		SF360TA		
950	760				
1000	800				
830	664	60	F360TA		
950	760		SF360TA		
1.047	838				
1.000	800	50	F480TA	COP	48
1.100	880		SF480TA		
1.250	1.000				
1.100	880	60	F480TA		
1.300	1.040		SF480TA		
1.400	1.120				

Marine Electric Propulsion Gensets

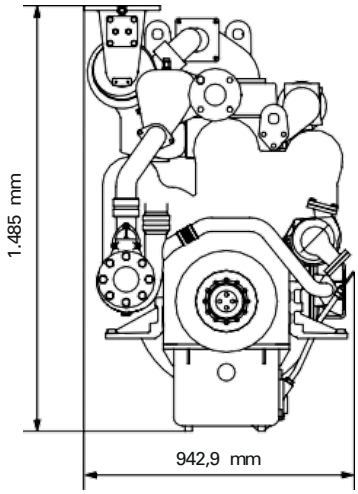
kVA	kWe	Hz	Type	Rating	Page
345	276	50	F180TA	COP	51
400	320		SF180TA		
460	368				
400	320	60	F180TA		
440	352		SF180TA		
520	416				
500	400	50	F240TA	COP	52
600	480		SF240TA		
640	512				
600	480	60	F240TA		
650	520		SF240TA		
675	540				
690	552				
700	560	50	F360TA	COP	53
860	688		SF360TA		
950	760				
1000	800				
830	664	60	F360TA		
950	760		SF360TA		
1.050	840				
1.000	800	50	F480TA	COP	54
1.100	880		SF480TA		
1.250	1.000				
1.100	880	60	F480TA		
1.200	960		SF480TA		
1.300	1.040				

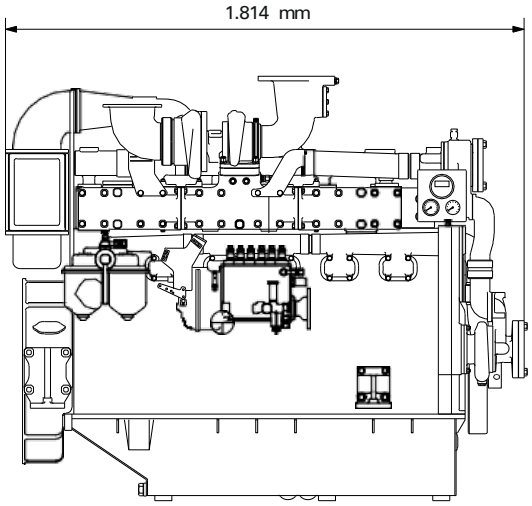
Hydraulic Clutch

kW	HP	rpm	Type	Rating	Page
294	400	1.800	E160	A	60
324	440			B	
662	900	1.800	E360	A	61
728	990		E160	B	

1.6.1 Propulsion Engines

F/SF180 Series
Propulsion Engines





Main data

Cycle (ISO 8178)	E3 (propulsion)
Disposition / Displacement	6 L / 17,96 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke diesel direct injection
Aspiration	Nat. aspirated / turbocharged - aftercooled
Rotation (from flywheel)	Counterclockwise

Propulsion ratings

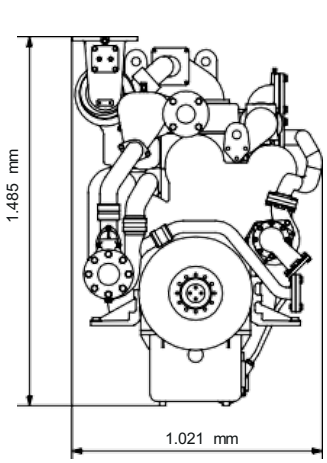
Engine Model	Rating	kWb	mHP	RPM	Fuel consumption (ISO 8178) L/h	Emissions
F180	A	184	250	1.800	N.A.	N.C.
SF180TA		380	515	1.400	60,7	IMO II / IMO III
SF180TA		412	560	1.600	67,4	
SF180TA		434	590	1.800	75,2	
SF180TA		441	600		76,5	
F180	B	191	260	1.800	N.A.	N.C.
F180TA		353	480		61,0	IMO II / IMO III
SF180TA		382	520		66,1	
SF180TA		474	645		82,2	
F180TA	C	404	550	1.800	70,4	IMO II / IMO III
SF180TA		504	685		88,3	
		552	750		95,8	N.C.

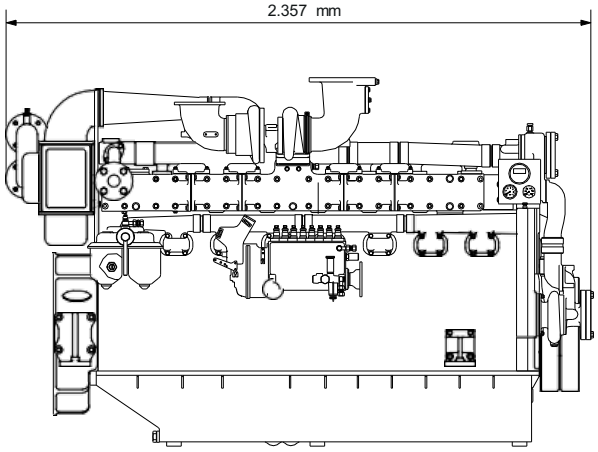
Weight

Dry weight (kg)	2.620

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

F/SF240 Series
Propulsion Engines





Main data

Cycle (ISO 8178)	E3 (propulsion)
Disposition / Displacement	8 L / 23,96 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke diesel direct injection
Aspiration	Turbocharged - aftercooled
Rotation (from flywheel)	Counterclockwise

Propulsion ratings

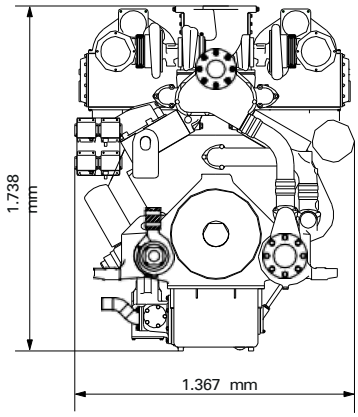
Engine Model	Rating	kWb	mHP	RPM	Fuel consumption (ISO 8178) L/h	Emissions
F240TA	A	478	650	1.800	80,1	IMO II / IMO III
SF240TA	A	484	660	1.400	78,6	IMO II / IMO III
SF240TA	A	552	750	1.600	93,3	IMO II / IMO III
SF240TA	A	577	785	1.800	97,0	CCNR2
SF240TA	A	588	800	1.800	98,9	IMO II / IMO III
F240TA	B	493	670	1.800	82,7	IMO II / IMO III
SF240TA	B	635	864	1.800	106,7	IMO II / IMO III
SF240TA	C	662	900	1.800	111,4	IMO II / IMO III

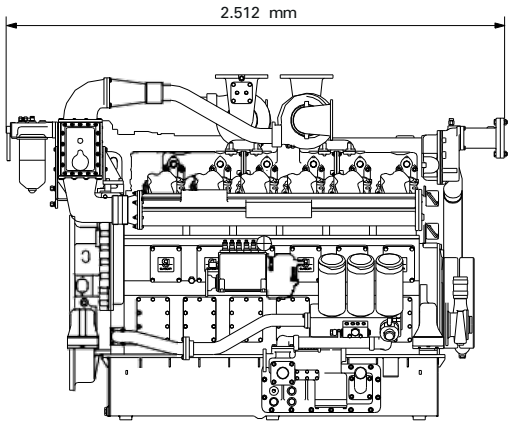
Weight

Dry weight (kg)	3.400

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

F/SF360 Series
Propulsion Engines





Main data

Cycle (ISO 8178)	E3 (propulsion)
Disposition / Displacement	12 V / 35,93 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke diesel direct injection
Aspiration	Turbocharged - aftercooled
Rotation (from flywheel)	Counterclockwise

Propulsion ratings

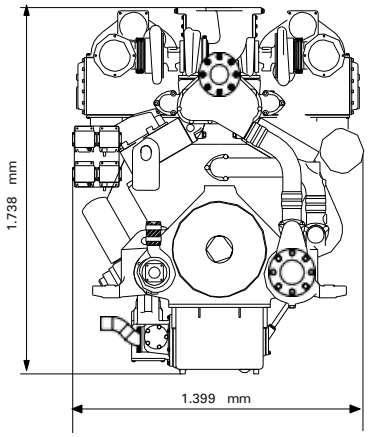
Engine Model	Rating	kWb	mHP	RPM	Fuel consumption (ISO 8178) L/h	Emissions
SF360TA	A	760	1.034	1.400	121,4	IMO II / IMO III
		824	1.120	1.600	134,3	
		868	1.180	1.800	150,1	CCNR2
		882	1.200		149,9	IMO II / IMO III
F360TA	B	706	960	1.800	119,2	IMO II / IMO III
SF360TA		810	1.100	1.400	128,6	
		949	1.290	1.800	161.6	
SF360TA	C	1000	1.360	1.800	170,2	IMO II / IMO III

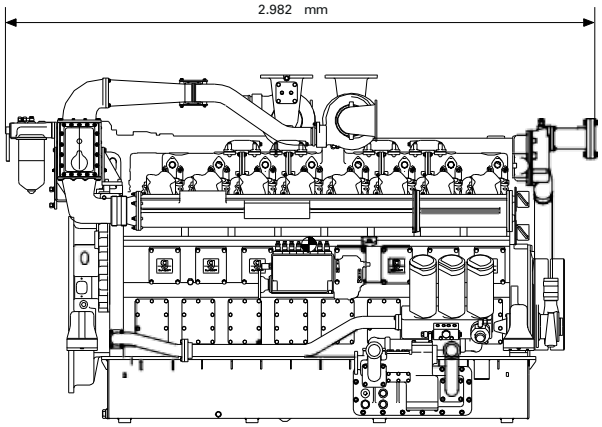
Weight

Dry weight (kg)	4.630

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

F/SF480 Series
Propulsion Engines





Main data

Cycle (ISO 8178)	E3 (propulsion)
Disposition / Displacement	16 V / 47,90 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke diesel direct injection
Aspiration	Turbocharged - aftercooled
Rotation (from flywheel)	Counterclockwise

Propulsion ratings

Engine Model	Rating	kWb	mHP	RPM	Fuel consumption (ISO 8178) L/h	Emissions
SF480TA	A	968	1.270	1.400	156,4	IMO II / IMO III
		1.103	1.500	1.600	185,4	
		1.177	1.600	1.800	195,4	
F480TA	B	993	1.350	1.800	164,7	IMO II / IMO III
SF480TA		1.268	1.724		211,2	
F480TA	C	1.029	1.400	1.800	171,3	IMO II / IMO III
SF480TA		1.324	1.800		220,8	

Weight

Dry weight (kg)	5.450

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

1.6.2 Gearboxes

R-160
Gearbox

Main data

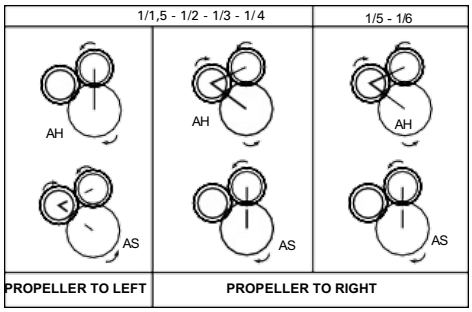
FP gearbox
Hydraulic multi-disc clutches
Case-hardened grinded helical gears
Thrust bearings
Heat exchanger
Oil pressure damper tank
Mounting brackets
Emergency mechanical clutch
Oil filtering full flow

Technical data

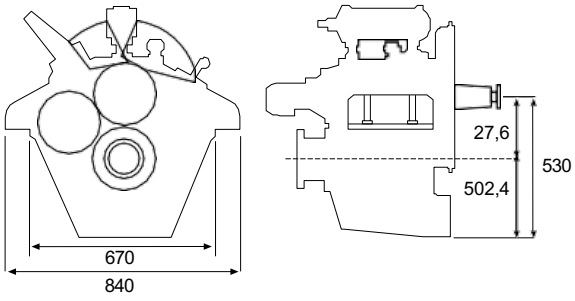
Reduction ratio: 1,53; 2,03; 3,14; 4,06; 4,91; 5,99. Available in both rotations, except for the reductions 4,91 and 5,99, only available right rotation sense.

Bell Housg. (SAE)	Rotation sense	Rating	Power kW / hP						RPM max.	Weight kg.
			1.200		1.600		1.800			
1,2	A	L / R	196	267	262	356	294	400	2.500	590
1,2	B	L / R	216	293	288	391	324	440	2.500	590

Rotation sense



Dimensions



Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

R-240/R-240V

Single Stage Gearbox

Main data

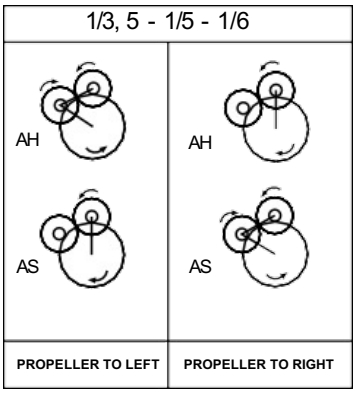
FP gear box
Hydraulic multi-disc clutches
Case-hardened grinded helical gears
Thrust bearings
Heat exchanger
Oil pressure damper tank
Mounting brackets
Emergency mechanical clutch
Oil filtering full flow

Technical data

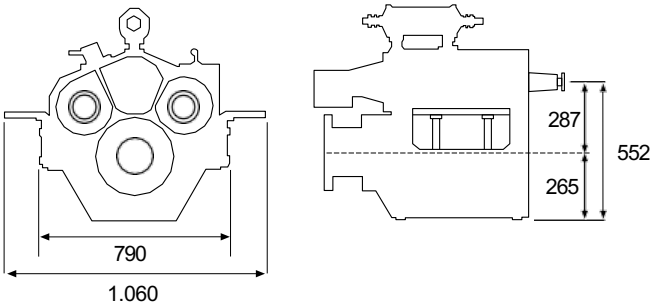
Reduction ratio: 2,90; 3,91; 4,95.

Gear Stages	Bell Housg. (SAE)	Rating	Rotation	Power kW / hP						RPM max.	Weight kg.
				1.200		1.600		1.800			
1	1,1/2,0	A	L / R	343	467	458	622	515	700	2.500	1.035
1	1,1/2,0	B	L / R	378	513	503	688	566	770	2.500	1.035

Rotation sense



Dimensions



Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

R-240E/EV

Double Stage Gearbox

Main data

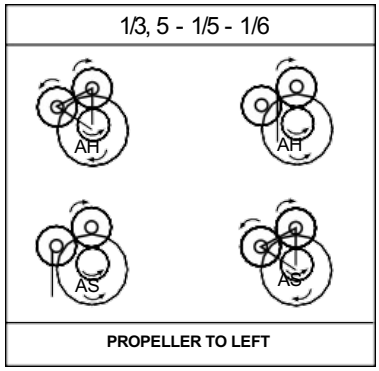
FP gear box
Hydraulic multi-disc clutches
Case-hardened grinded helical gears
Thrust bearings
Heat exchanger
Oil pressure damper tank
Mounting brackets
Emergency mechanical clutch
Oil filtering full flow

Technical data

Reduction ratio: 3,56; 4,80; 6,08.

Gear Stages	Bell Housg. (SAE)	Rating	Rotation	Power kW / hP						RPM max.	Weight kg.
				1.200		1.600		1.800			
2	1,1/2,0	A	L / R	294	400	392	533	441	600	2.500	1.057
2	1,1/2,0	B	L / R	324	440	431	587	485	660	2.500	1.057

Rotation sense



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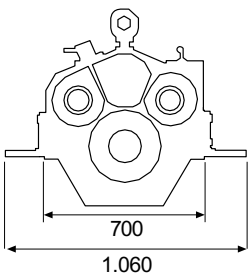
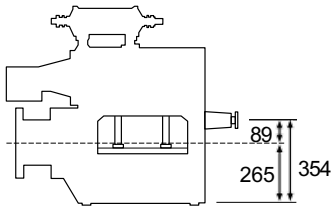




Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

R-360/R-360V

Single Stage Gearbox

Main data

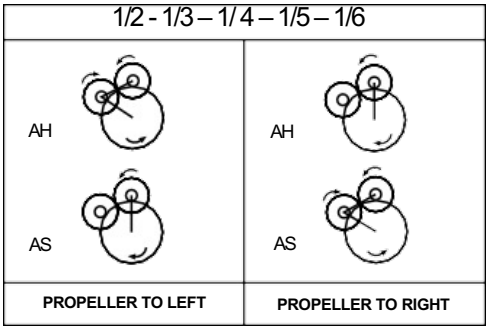
FP gear box
Hydraulic multi-disc clutches
Case-hardened grinded helical gears
Thrust bearings
Heat exchanger
Oil pressure damper tank
Mounting brackets
Emergency mechanical clutch
Oil filtering full flow

Technical data

Reduction ratio: 2,04; 3,25; 4,38; 5,1; 6,0.

Pair of gears	Bell Housg. (SAE)	Rating	Rotation sense	Power kW / hP						RPM max.	Weight kg.
				1.200		1.600		1.800			
1	1,1/2,0	A	L / R	441	600	588	800	662	900	2.000	1.270
1	1,1/2,0	B	L / R	485	660	647	880	728	990	2.000	1.270

Rotation sense



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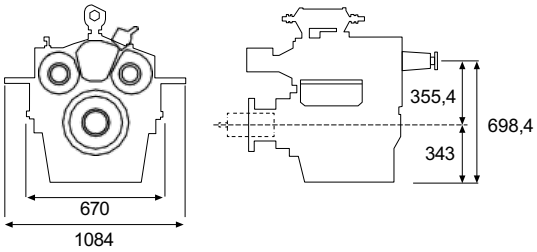


Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

R-360E/EV

Double Stage Gearbox

Main data

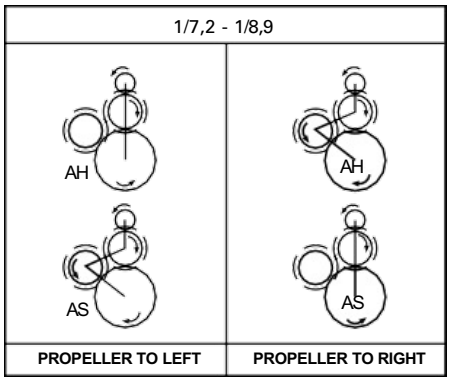
FP gear box
Hydraulic multi-disc clutches
Case-hardened grinded helical gears
Thrust bearings
Heat exchanger
Oil pressure damper tank Mounting
Brackets
Emergency mechanical clutch
Oil filtering full flow

Technical data

Reduction ratio: 7,20; 8,90 (Valid for fixed and variable pitch propeller)

Pair of gears	Bell Housg. (SAE)	Rating	Rotation sense	Power kW / hP						RPM max.	Weight kg.
				1.200		1.600		1.800			
2	1,1/2,0	A	L / R	343	467	458	622	515	700	2.000	1.350
2	1,1/2,0	A	L / R	294	400	392	533	441	600	2.500	1.350
2	1,1/2,0	B	L / R	378	513	503	684	566	770	2.000	1.350
2	1,1/2,0	B	L / R	324	440	431	587	485	660	2.500	1.350

Rotation sense



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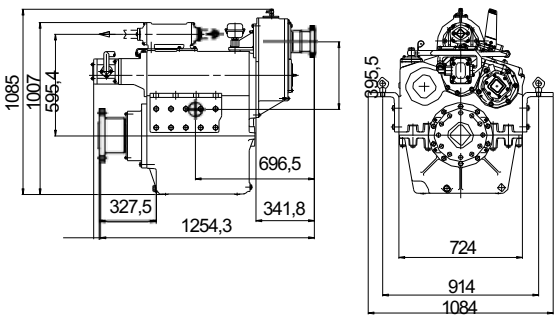


Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

R-500
Gearbox

Main data

FP gear box
Hydraulic multi-disc clutches
Case-hardened grinded helical gears
Thrust bearings
Heat exchanger
Oil pressure damper tank
Mounting brackets
Emergency mechanical clutch
Oil filtering full flow

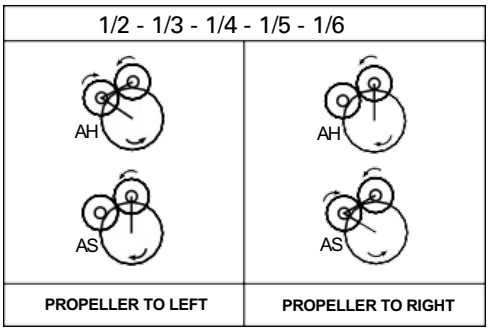
Technical data

Reduction ratio: 2,69; 3,25; 3,97; 4,86; 6,08; 7,03 (Valid for fixed and variable pitch propeller)

Bell Housg. (SAE)	Rating	Rotation sense	Power kW / hP						RPM max.	Weight kg.
			1,200		1,600		1,800			
N.A	A	L / R	819	1.113	1.092	1.483	1.228	1.670	1.900	2.700
N.A	B	L / R	901	1.225	1.201	1.632	1.351	1.837	1.900	2.700

Note: For reduction 7,03 the only rotation sense availble is right.

Rotation sense



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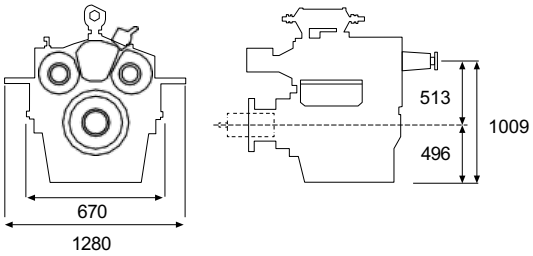
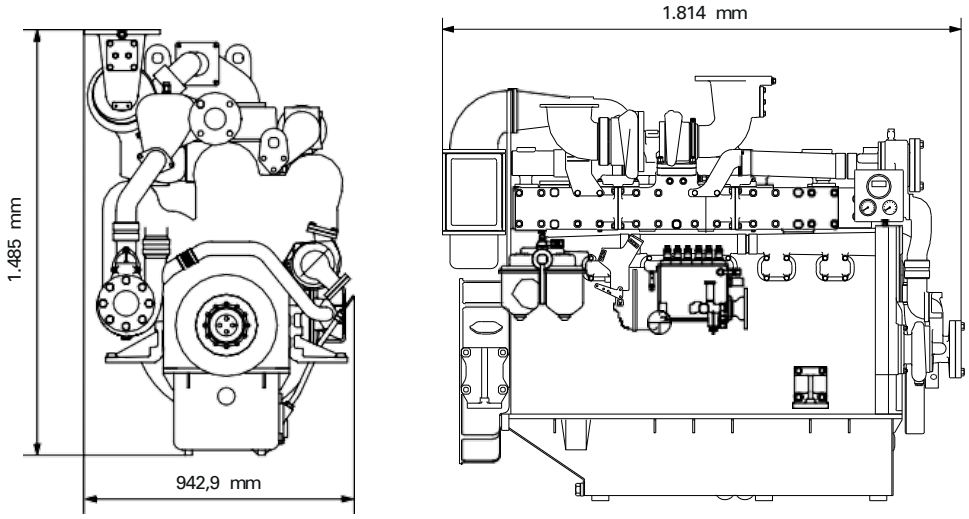


Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

1.6.3 Auxiliary Engines Variable Speed

F/SF180 Series

Auxiliary Engines Variable Speed



Main data

Cycle (ISO 8178)	C1 (Auxiliary)
Disposition / Displacement	6 L / 17,96 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke diesel direct injection
Aspiration	Nat. aspirated / turbocharged - aftercooled
Rotation (from flywheel)	Counterclockwise

Auxiliary ratings

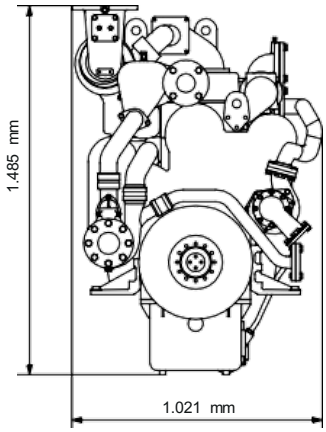
Engine Model70,	Rating	kWb	mHP	RPM	Fuel consumption (ISO 8178) L/h	Emissions
F180	A	184	250	1.800	N.A.	N.C.
SF180TA		434	590	1.800	60,5	IMO II / IMO III
SF180TA		441	600		61,5	
F180	B	191	260	1.800	N.A.	N.C.
F180TA		353	480		49,0	IMO II / IMO III
SF180TA		382	520		53,1	
SF180TA		474	645	1.800	66,2	
F180TA	C	404	549	1.800	56,2	IMO II / IMO III
SF180TA		504	685		70,5	

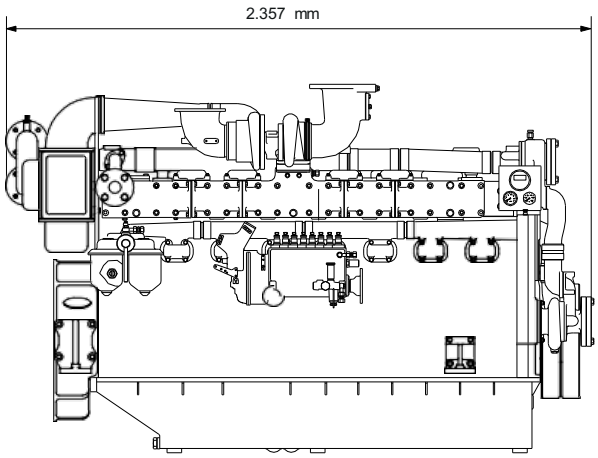
Weight

Dry weight (kg)	2.620

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

F/SF240 Series
Auxiliary Engines Variable Speed





Main data

Cycle (ISO 8178)	C1 (Auxiliary)
Disposition / Displacement	8 L / 23,96 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke diesel direct injection
Aspiration	Nat. aspirated / turbocharged - aftercooled
Rotation (from flywheel)	Counterclockwise

Auxiliary ratings

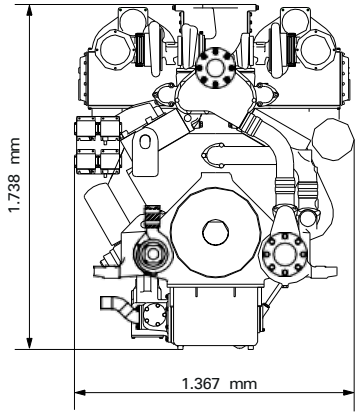
Engine Model	Rating	kWb	mHP	RPM	Fuel consumption (ISO 8178) L/h	Emissions
F240TA	A	478	650	1.800	66,9	IMO II / IMO III
SF240TA		588	800		81,4	IMO II / IMO III
F240TA	B	493	670	1.800	68,9	IMO II / IMO III
SF240TA		635	864		87,5	
SF240TA	C	662	900	1.800	91,0	IMO II / IMO III

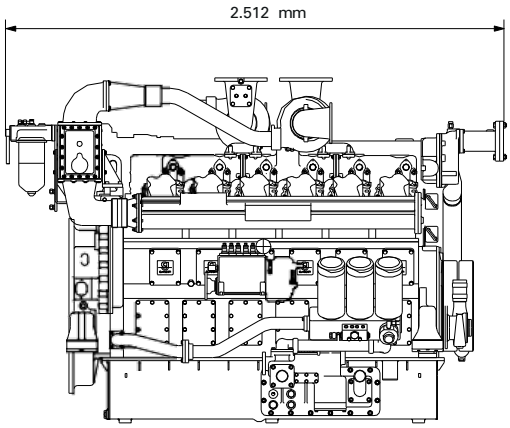
Weight

Dry weight (kg)	3.400

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

F/SF360 Series
Auxiliary Engines Variable Speed





Main data

Cycle (ISO 8178)	C1 (Auxiliary)
Disposition / Displacement	12 V / 35,93 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke diesel direct injection
Aspiration	Nat. aspirated / turbocharged - aftercooled
Rotation (from flywheel)	Counterclockwise

Auxiliary ratings

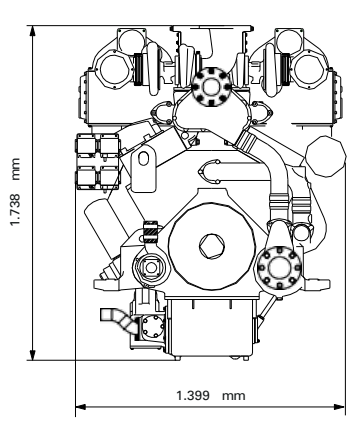
Engine Model	Rating	kWb	mHP	RPM	Fuel consumption (ISO 8178) L/h	Emissions
SF360TA	A	882	1.200	1.800	122,9	IMO II / IMO III
F360TA	B	706	480	1.800	97,9	IMO II / IMO III
SF360TA		949	550	1.800	132,5	
SF360TA	C	1000	1.360	1.800	139,9	IMO II / IMO III

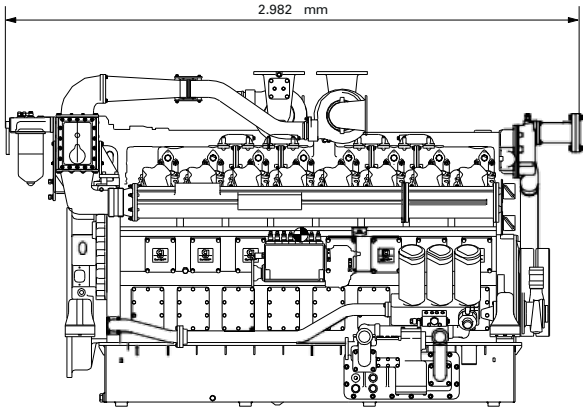
Weight

Dry weight (kg)	4.630

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

F/SF480 Series
Auxiliary Engines Variable Speed





Main data

Cycle (ISO 8178)	C1 (Auxiliary)
Disposition / Displacement	16 V / 47,90 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke diesel direct injection
Aspiration	Nat. aspirated / turbocharged - aftercooled
Rotation (from flywheel)	Counterclockwise

Auxiliary ratings

Engine Model	Rating	kWb	mHP	RPM	Fuel consumption (ISO 8178) L/h	Emissions
SF480TA	A	1.177	1.600	1.800	163,6	IMO II / IMO III
F480TA	B	993	1.350	1.800	139,2	IMO II / IMO III
SF480TA		1.268	1.724		175,6	
F480TA	C	1.029	1.400	1.800	144,0	IMO II / IMO III
SF480TA		1.324	1.800		182,9	

Weight

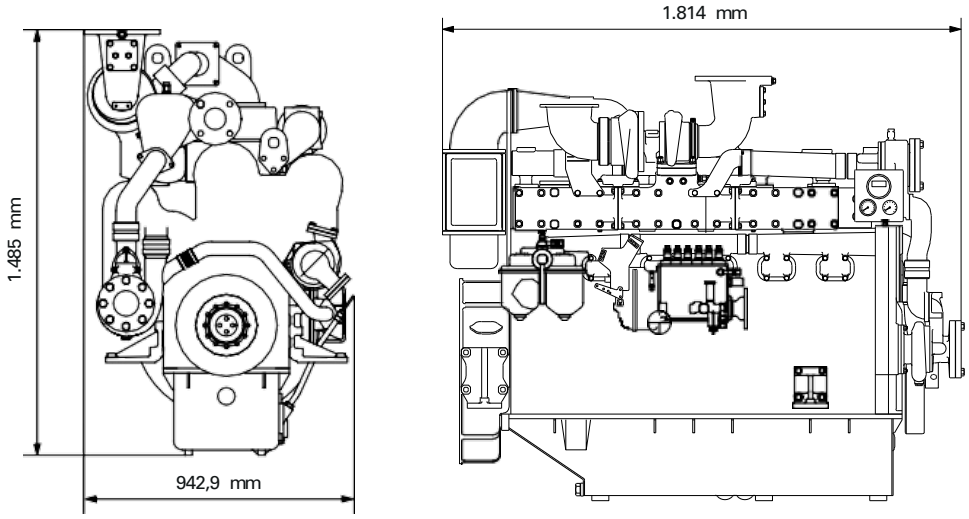
Dry weight (kg)	4.630

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

1.6.4 Marine Power Generation Engines

F/SF180 Series

Marine Power Generation Engines



Main data

Cycle (ISO 8178)	E2 (propulsion constant speed)
Disposition / Displacement	6 L / 17,96 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke diesel direct injection
Aspiration	Turbocharged – aftercooled
Rotation (from flywheel)	Counterclockwise

Propulsion rating at constant speed

Engine Model	kWb	mHP	RPM	Fuel consumption (ISO 8178)	Emissions
				L/h	
F180TA	294	400	1.500	50,6	IMO II / IMO III
SF180TA	383	520		64,1	
	396	540		66,0	
	421	573		70,0	
F180TA	346	470	1.800	62,4	IMO II / IMO III
SF180TA	434	590		76,6	
	441	600		77,7	

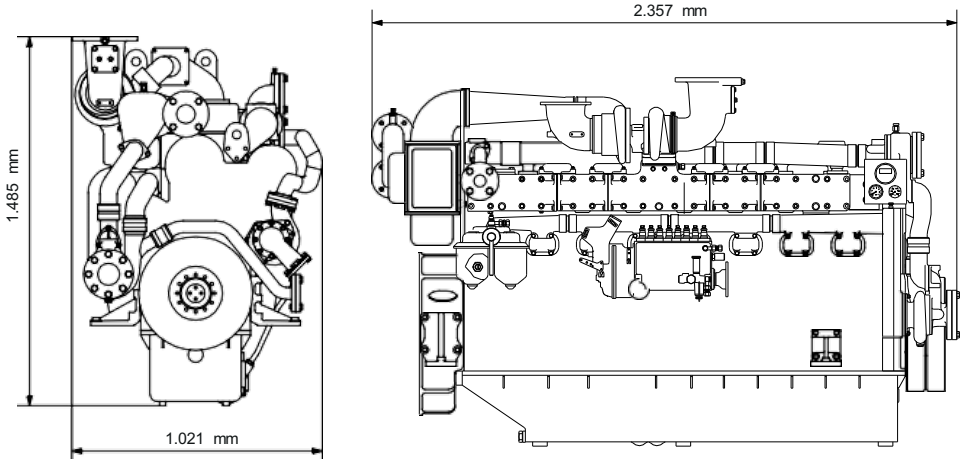
Weight

Dry weight (kg)	2.620

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

F/SF240 Series

Marine Power Generation Engines



Main data

Cycle (ISO 8178)	E2 (propulsion constant speed)
Disposition / Displacement	8 L / 23,96 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke diesel direct injection
Aspiration	Turbocharged – aftercooled
Rotation (from flywheel)	Counterclockwise

Propulsion rating at constant speed

Engine Model	kWb	mHP	RPM	Fuel consumption (ISO 8178)	Emissions
				L/h	
F240TA	426	579	1.500	70,8	IMO II / IMO III
SF240TA	510	694		83,9	
	540	734		88,7	
F240TA	478	650	1.800	85,8	IMO II / IMO III
SF240TA	577	785		102,7	CCNR
	588	800		104,7	IMO II / IMO III

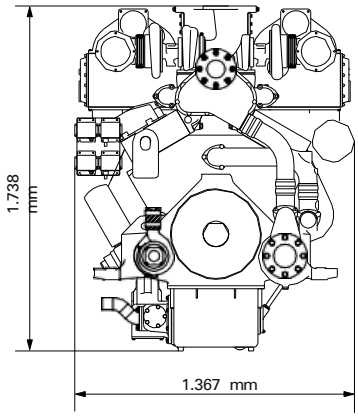
Weight

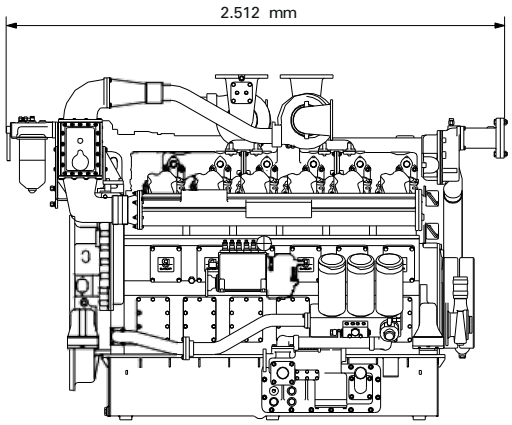
Dry weight (kg)	3.400

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

F/SF360 Series

Marine Power Generation Engines





Main data

Cycle (ISO 8178)	E2 (propulsion constant speed)
Disposition / Displacement	12 V / 35,93 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke diesel direct injection
Aspiration	Turbocharged - aftercooled
Rotation (from flywheel)	Counterclockwise

Propulsion rating at constant speed

Engine Model	kWb	mHP	RPM	Fuel consumption (ISO 8178) L/h	Emissions
F360TA	588	800	1.500	99,4	IMO II / IMO III / CCNR2
SF360TA	765	1.040		128,5	IMO II / IMO III / CCNR2
	800	1.088		133,7	IMO II / IMO III
	840	1.142		140,9	
F360TA	699	950	1.800	123,2	IMO II / IMO III
SF360TA	866	1.178		149,8	IMO II / IMO III / CCNR2
	883	1.200		152,3	IMO II /IMO III

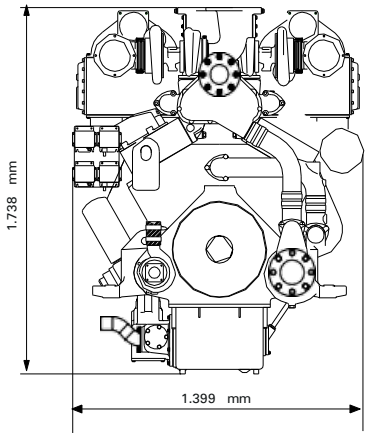
Weight

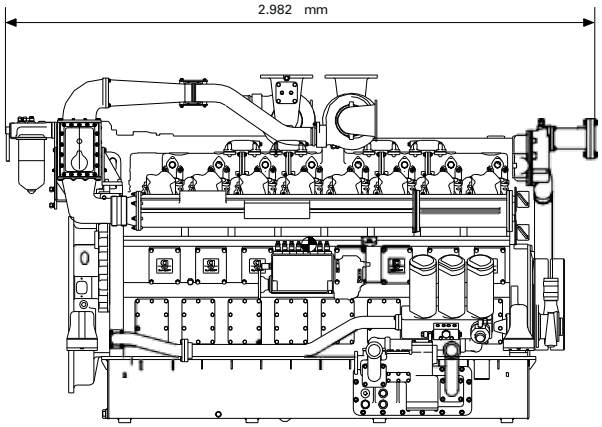
Dry weight (kg)	4.630

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

F/SF480 Series

Marine Power Generation Engines





Main data

Cycle (ISO 8178)	E2 (propulsion constant speed)
Disposition / Displacement	16 V / 47,90 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke diesel direct injection
Aspiration	Turbocharged - aftercooled
Rotation (from flywheel)	Counterclockwise

Propulsion rating at constant speed

Engine Model	kWb	mHP	RPM	Fuel consumption (ISO 8178) L/h	Emissions
F480TA	846	1.150	1.500	140,9	IMO II / IMO III / CCNR2
SF480TA	1.020	1.388		169,2	IMO II / IMO III / CCNR2
	1.050	1.428		174,0	IMO II / IMO III
F480TA	934	1.270	1.800	166,6	IMO II / IMO III / CCNR2
SF480TA	1.155	1.571		202,7	IMO II / IMO III / CCNR2
	1.177	1.600		206,9	IMO II / IMO III

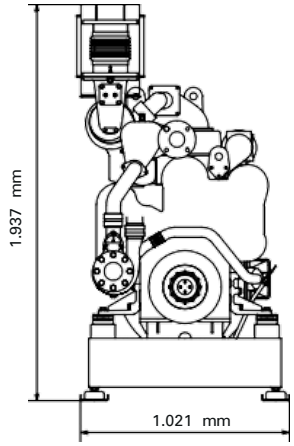
Weight

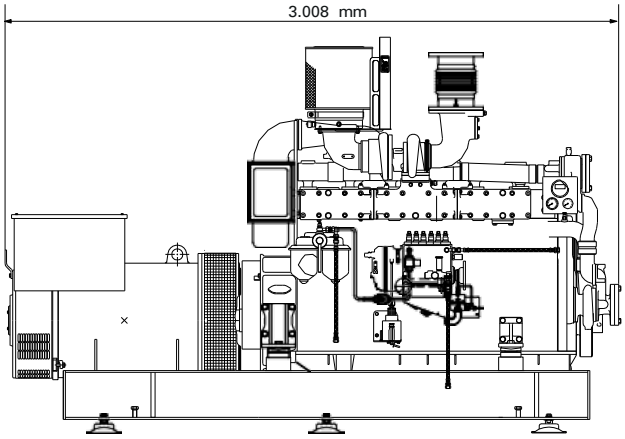
Dry weight (kg)	5.450

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

1.6.5 Marine Power Generation Sets

F/SF180 Series
Marine Power Generation Set





Main data

Cycle (ISO 8178)	D2 (auxiliary generator set)
Disposition / Displacement	6 L / 17,96 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke diesel
Combustion system	Direct injection
Generator characteristics	Synchronous
Voltage regulation	AVR electronic
Excitation	AREP self-excited, brushless
Generator protection	IP23
Heating class	F
Insulation class	H
Construction	Simple bearing

Auxiliary generator set COP ratings

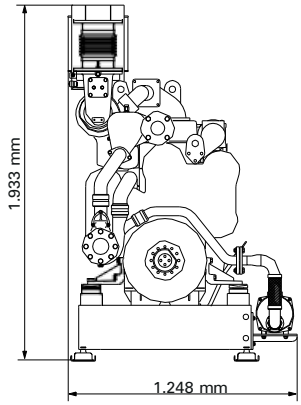
Engine model	Speed (f)	Electrical power (cosφ 0,8)		Voltage	Fuel consumption (ISO 8178)	Emissions
		kVA	kWe	V	L/h	
F180TA	1.500 (50Hz)	345	276	380 / 400	37,4	IMO II /IMO III
SF180TA		400	320		46,3	
		460	368		47,2	
F180TA	1.800 (60Hz)	400	320	450 / 480	46,2	IMO II / IMO III
SF180TA		440	352		55,6	
		520	416		56,3	

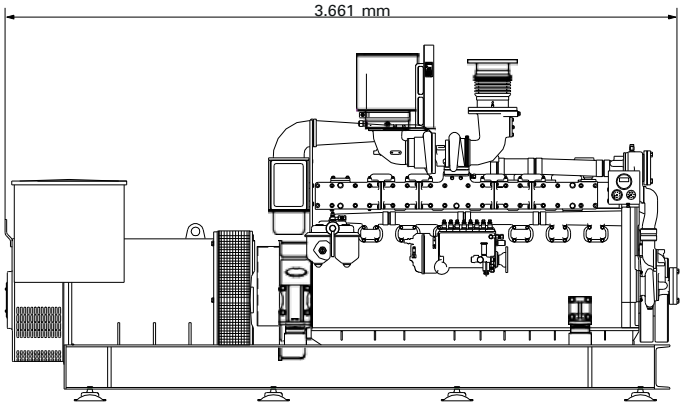
Weight

Dry weight (kg)	4.410

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

F/SF240 Series
Marine Power Generation Set





Main data

Cycle (ISO 8178)	D2 (auxiliary generator set)
Disposition / Displacement	8 L / 23,96 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke diesel
Combustion system	Direct injection
Generator characteristics	Synchronous
Voltage regulation	AVR electronic
Excitation	AREP self-excited, brushless
Generator protection	IP23
Heating class	F
Insulation class	H
Construction	Simple bearing

Auxiliary generator set COP ratings

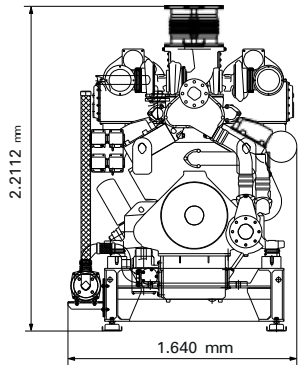
Engine model	Speed (f)	Electrical power (cosφ 0,8)		Voltage	Fuel consumption (ISO 8178)	Emissions
		kVA	kWe	V	L/h	
F240TA	1.500 (50Hz)	500	400	380 / 400	51,6	IMO II / IMO III
		600	480		60,4	
SF240TA		640	512		63,7	
F240TA	1.800 (60Hz)	600	480	450 / 480	63,3	IMO II / IMO III
SF240TA		650	520		74,5	
		690	552		75,8	IMO II / IMO III

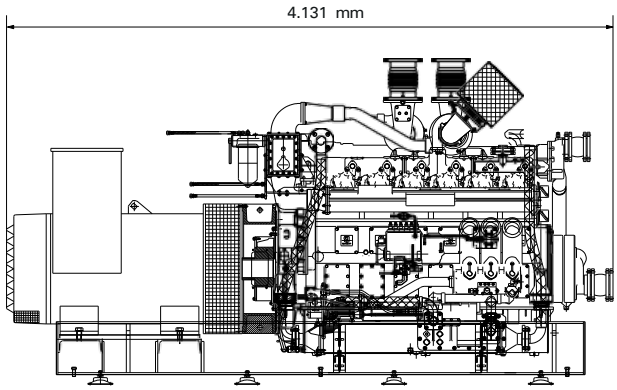
Weight

Dry weight (kg)	5.530

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

F/SF360 Series
Marine Power Generation Set





Main data

Cycle (ISO 8178)	D2 (auxiliary generator set)
Disposition / Displacement	12 V / 35,93 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke diesel
Combustion system	Direct injection
Generator characteristics	Synchronous
Voltage regulation	AVR electronic
Excitation	AREP self-excited, brushless
Generator protection	IP23
Heating class	F
Insulation class	H
Construction	Double bearing

Auxiliary generator set COP ratings

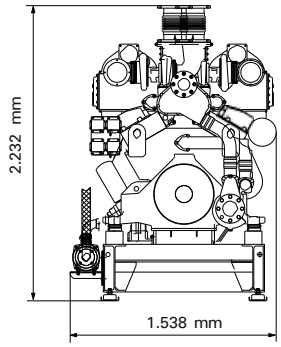
Engine model	Speed (f)	Electrical power (cosφ 0,8)		Voltage	Fuel consumption (ISO 8178)	Emissions
		kVA	kWe	V	L/h	
F360TA	1.500 (50Hz)	700	560	380 / 400	72,8	IMO II / IMO III / CCNR2
SF360TA		860	688		92,6	
		950	760		95,5	
		1000	800		101,4	
F360TA	1.800 (60Hz)	830	664	450 / 480	91,3	IMO II / IMO III / CCNR2
SF360TA		950	760		109,1	
		1.047	838		110,6	

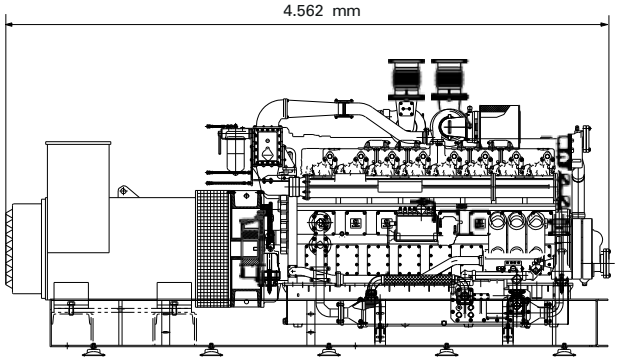
Weight

Dry weight (kg)	8.800

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

F/SF480 Series
Marine Power Generation Set





Main data

Cycle (ISO 8178)	D2 (auxiliary generator set)
Disposition / Displacement	16 V / 47,90 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke diesel
Combustion system	Direct injection
Generator characteristics	Synchronous
Voltage regulation	AVR electronic
Excitation	AREP self-excited, brushless
Generator protection	IP23
Heating class	F
Insulation class	H
Construction	Double bearing

Auxiliary generator set COP ratings

Engine model	Speed (f)	Electrical power (cosφ 0,8)		Voltage	Fuel consumption (ISO 8178)	Emissions
		kVA	kWe	V	L/h	
F480TA	1.500 (50Hz)	1.000	800	380 / 400	102,2	IMO II / IMO III / CCNR2
SF480TA		1.100	880		121,3	
		1.250	1.000		124,6	
F480TA	1.800 (60Hz)	1.100	880	450 / 480	123,1	IMO II / IMO III / CCNR2
SF480TA		1.300	1.040		147,7	
		1.400	1.120		150,4	

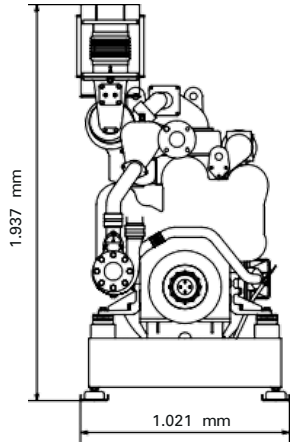
Weight

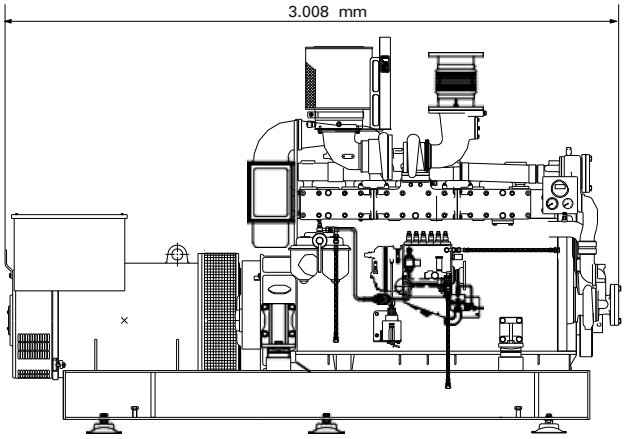
Dry weight (kg)	9.840

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

1.6.6 Marine Electric Propulsion Gensets

F/SF180 Series
Marine Electric Propulsion Genset





Main data

Cycle (ISO 8178)	E2 (diesel - electric propulsion)
Disposition / Displacement	6 L / 17,96 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke diesel
Combustion system	Direct injection
Generator characteristics	Synchronous
Voltage regulation	AVR electronic
Excitation	AREP self-excited, brushless
Generator protection	IP23
Heating class	F
Insulation class	H
Construction	Simple bearing

DEP generator set COP ratings

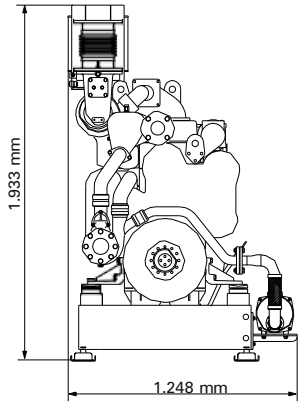
Engine model	Speed (f)	Electrical power (cosφ 0,8)		Voltage	Fuel consumption (ISO 8178)	Emissions
		kVA	kWe	V	L/h	
F180TA	1.500 (50Hz)	345	276	380 / 400	50,6	IMO II / IMO III
SF180TA		400	320		64,1	
		460	368		66,0	
F180TA	1.800 (60Hz)	400	320	450 / 480	62,4	IMO II / IMO III
SF180TA		440	352		76,6	
		520	416		77,7	

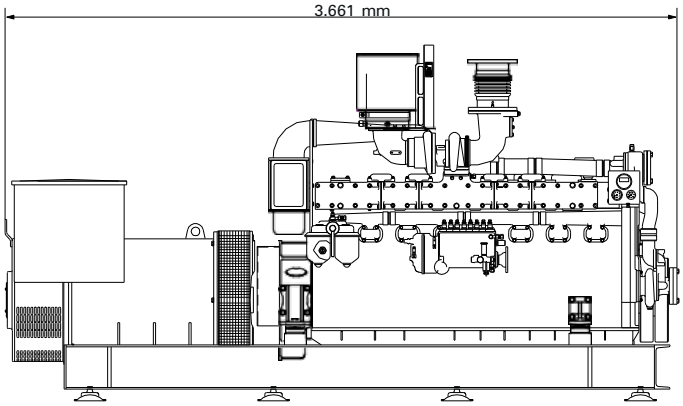
Weight

Dry weight (kg)	4.410

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

F/SF240 Series
Marine Electric Propulsion Genset





Main data

Cycle (ISO 8178)	E2 (diesel - electric propulsion)
Disposition / Displacement	8 L / 23,96 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke diesel
Combustion system	Direct injection
Generator characteristics	Synchronous
Voltage regulation	AVR electronic
Excitation	AREP self-excited, brushless
Generator protection	IP23
Heating class	F
Insulation class	H
Construction	Simple bearing

DEP generator set COP ratings

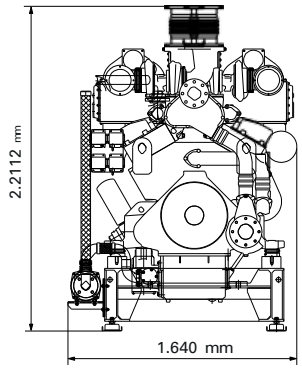
Engine model	Speed (f)	Electrical power (cosφ 0,8)		Voltage	Fuel consumption (ISO 8178)	Emissions
		kVA	kWe	V	L/h	
F240TA	1.500 (50Hz)	500	400	380 / 400	70,8	IMO II / IMO III
		600	480		83,9	
SF240TA		640	512		88,7	
F240TA	1.800 (60Hz)	600	480	450 / 480	85,8	IMO II / IMO III
SF240TA		650	520		102,7	
		675	540		100,3	CCNR2
		690	552		104,7	IMO II / IMO III

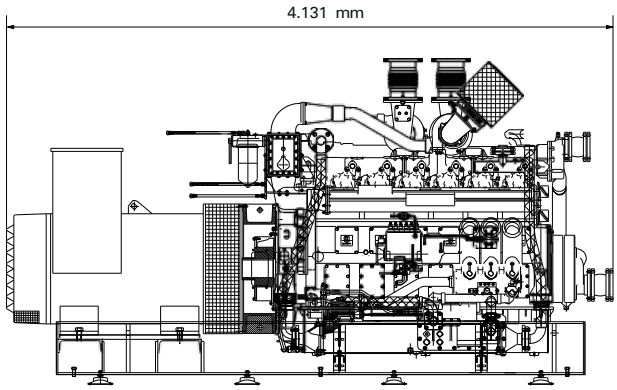
Weight

Dry weight (kg)	5.530

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

F/SF360 Series
Marine Electric Propulsion Genset





Main data

Cycle (ISO 8178)	E2 (diesel - electric propulsion)
Disposition / Displacement	12 V / 35,93 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke diesel
Combustion system	Direct injection
Generator characteristics	Synchronous
Voltage regulation	AVR electronic
Excitation	AREP self-excited, brushless
Generator protection	IP23
Heating class	F
Insulation class	H
Construction	Double bearing

DEP generator set COP ratings

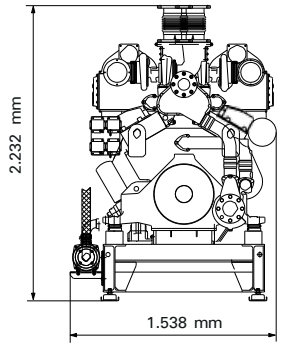
Engine model	Speed (f)	Electrical power (cosϕ 0,8)		Voltage	Fuel consumption (ISO 8178)	Emissions
		kVA	kWe	V	L/h	
F360TA	1.500 (50Hz)	700	560	380 / 400	99,4	IMO II / IMO III / CCNR2
SF360TA		860	688		128,5	
		950	760		133,7	
		1000	800		140,9	
F360TA	1.800 (60Hz)	830	664	450 / 480	123,2	IMO II / IMO III / CCNR2
SF360TA		950	760		149,8	
		1.050	840		152,3	

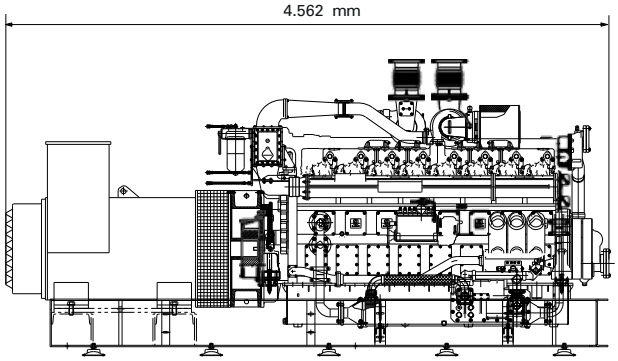
Weight

Dry weight (kg)	8.800

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

F/SF480 Series
Marine Electric Propulsion Genset





Main data

Cycle (ISO 8178)	E2 (diesel - electric propulsion)
Disposition / Displacement	16 V / 47,90 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke diesel
Combustion system	Direct injection
Generator characteristics	Synchronous
Voltage regulation	AVR electronic
Excitation	AREP self-excited, brushless
Generator protection	IP23
Heating class	F
Insulation class	H
Construction	Double bearing

DEP generator set COP ratings

Engine model	Speed (f)	Electrical power (cosϕ 0,8)		Voltage	Fuel consumption (ISO 8178)	Emissions
		kVA	kWe	V	L/h	
F480TA	1.500 (50Hz)	1.000	800	380 / 400	140,9	IMO II / IMO III / CCNR2
SF480TA		1.100	880		169,2	
		1.250	1.000		174,0	
F480TA	1.800 (60Hz)	1.100	880	450 / 480	166,6	IMO II / IMO III / CCNR2
SF480TA		1.200	960		174,0	
		1.300	1.040		202,7	
		1.400	1.120		206,9	

Weight

Dry weight (kg)	9.840

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

1.6.7 Marine Control Systems

Marine Control System

The Guascor Energy Marine Control System has been designed to carry out the functions of monitoring and protection of the engine or genset during its operation.

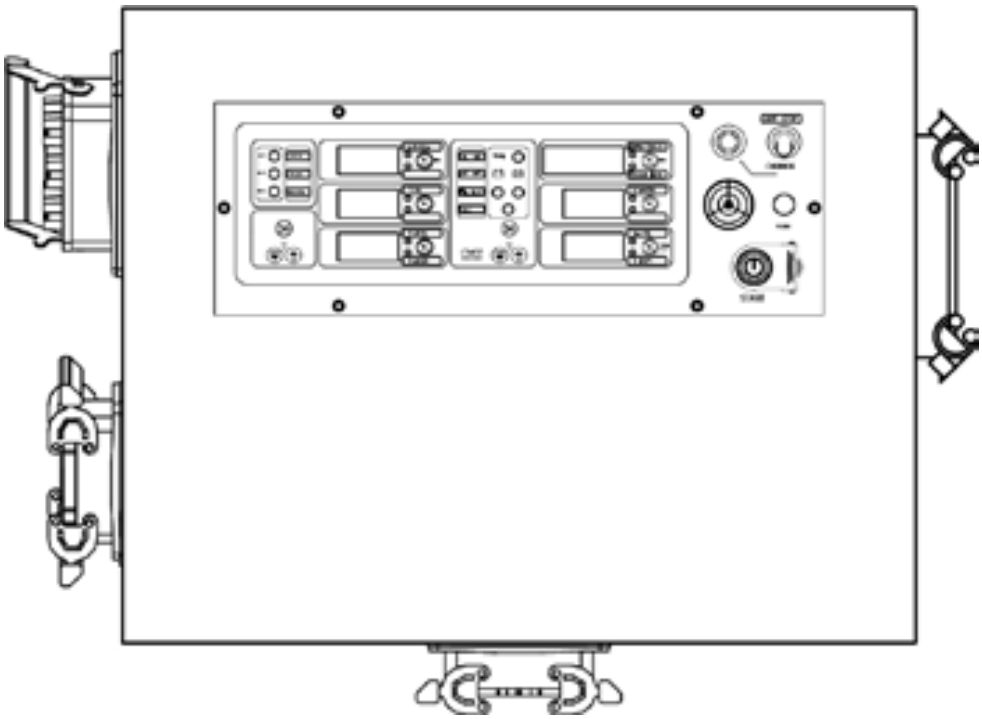
The control device is in charge of the supervision and management of the engine´s main paramenters activating the visual and sound alarms as well as performing the start up and stop functions of the generator set. A backup module is in charge of safety functions such as switching the principal and auxiliary feeds.

There are two different configurations available depending on the used technology.

Marine Control System - Basic

The Marine Control System-Basic, MCS-Basic, is a totally programmable control panel controlled by a microprocessor. All functions performed by the MCS - Basic are simple and intuitive including the mesasurement and alarm set which are also simple and inmediate.

As an option, the MCS-Basic would be completed with an external display device to be installed remotely.

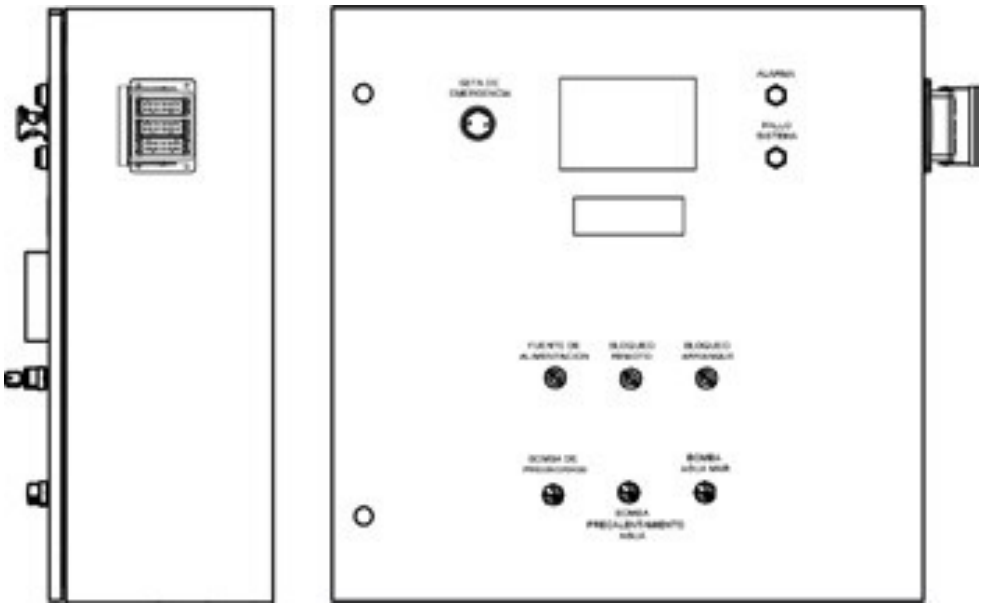


Marine Control System - Advance

The Marine Control System-Advance, MCS-Advance, is a totally programmable control panel controlled by an specific control device, ECU-MARINE. This equipment performs the functions of monitoring and protecting the engine or genset, displaying the main parameters, activating the visual and sound alarms and performing the start up and spot functions of the machine.

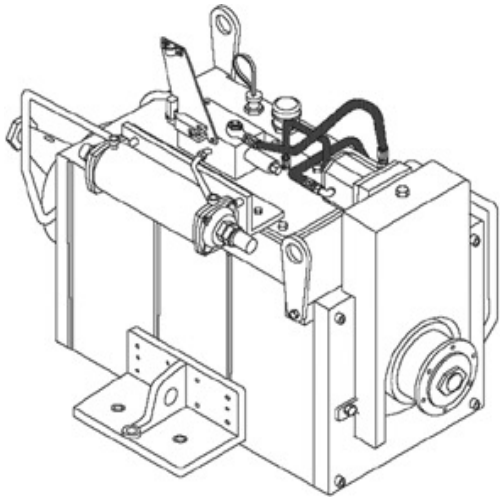
As an option, the MCS-Advance would be completed with an external display device to be installed remotely.

The MCS-Advance complies with the demanded requirements of the different Classification Entities, such Bureau Veritas, Lloyds Register or American Bureau of Shipping.



1.6.8 Hydraulic Clutches

E 160
Hydraulic Clutch

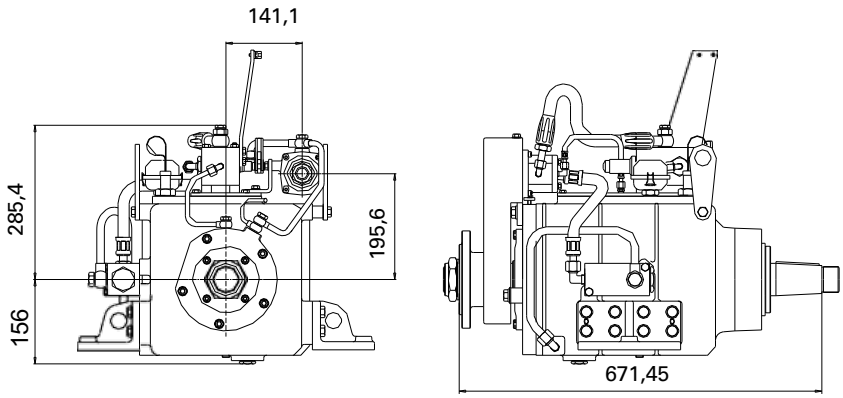


Main data

Hydraulic clutch P.T.O.
Cast iron casing
Inlet and outlet shafts Oil
cooler
Oil pump
Full flow oil filter
Oil distributor with control valve
Mounting brackets

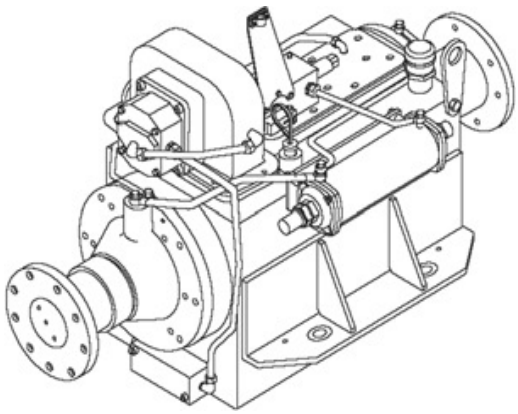
Reduction	Rating	Rotation sense	Power kW / hP						RPM max.	Weight kg.
			1.200		1.600		1.800			
1,00	A	L / R	196	267	262	356	294	400	2.500	140
1,00	B	L / R	216	293	288	391	324	440	2.500	140

Dimensions



Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

E 360
Hydraulic Clutch

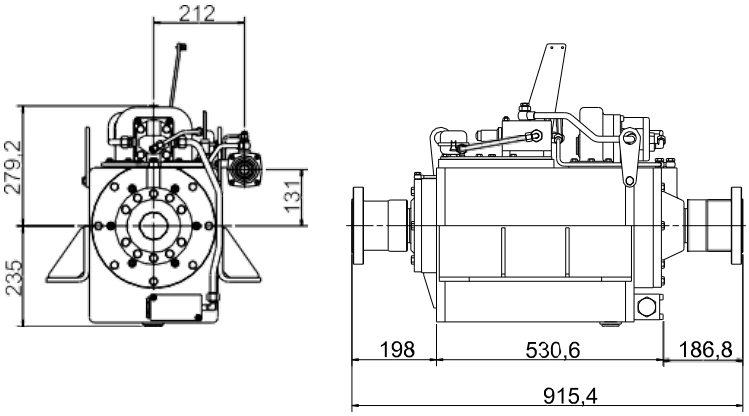


Main data

Hydraulic clutch P.T.O.
Cast iron casing
Inlet and outlet shafts
Oil cooler
Oil pump
Full flow oil filter
Oil distributor with control valve
Mounting brackets

Reduction	Rating	Rotation sense	Power kW / HP						RPM max.	Weight kg.
			1.200		1.600		1.800			
1.00	A	L / R	441	600	588	800	662	900	2.000	300
1.00	B	L / R	485	660	647	880	728	990	2.000	300

Dimensions



Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

Marine Gas Engines & Gensets

Contents

2. Gas

2.1 Power Definition

Guascor Energy diesel engines ratings stated in this document are based on ISO3046-1:2002(E), ISO3046-3:2006(E) and ISO15550:2002(E) standards.
These ratings have been measured (including all engine driven mechanical pumps).

Abbreviations ICFN / IFN power

I = ISO Standard (3046)

C = Continuous

F = Fuel stop

N = Net power

Our Guascor Energy diesel engines are designed following the reference conditions. On vessels approved and/or surveyed by IACS members, "standard design conditions" are to be observed.

Standard reference conditions ISO 15550:2002

- Total barometric pressure: 100 kPa / 1.000 mbar
- Air temperature: 25ºC (77ºF) / 298 K
- Relative humidity: 30%
- Charge air coolant (raw): 25ºC (77ºF) / 298 K
- Charge air coolant (treated): 29ºC (84ºF) / 302 K

Standard design conditions ISO 3046-1:2002 & 3046-3:2006

- Total barometric pressure: 100 kPa / 1.000 mbar
- Air temperature: 45ºC (113ºF) / 318 K
- Relative humidity: 60%
- Charge air coolant (raw): 32ºC (89ºF) / 305 K
- Charge air coolant (treated): 36ºC (96ºF) / 309 K

2.2 Rating Definitions

Gas Electric Propulsion

Cop continuous power

Rated power (ISO8528) intended for continuous use in applications requiring uninterrupted service with high load factors for an unlimited number of hours per year; 10% overload available in a period of time of 1/12 operation hours and maximum 25 h/year.

Typical load factors: < 80% of rated power Full load operation time: 100% of time or 24/24h

Overload: 110% overload available 1/12h and max. 25h/year

Operation time: 5.000 - 8.000 h/year

Typical applications: Ferries, research vessels, passenger cruiser, tugboats, offshore vessels, freighters, and tankers.

Auxiliary and Generator Set

COP continuous power

Engines with this rating (ISO 8528) are available for supplying utility power at a constant 100% load for an unlimited number of hours per year. A 10% overload capability for a period of time of 1/12 operation hours and maxi- mum 25 h/year is additionally allowed to that specified on ISO 8528.

Typical load factors: 80-100% of rated power

Full load operation time: 100% of time or 24/24h

Overload: 110% overload available 1/12h and max. 25h/year.

Operation time: 5.000 - 8.000 h/year.

2.3 Fuel Consumption

The fuel consumption values published in this document have been calculated according to ISO8178 standard test cycles (ISO8178 E2 electric propulsion and D2 auxiliary applications). These values must be considered as indicative guidance but not considered absolute values. Fuel consumption may vary as it can be influenced by external factors such as ship application, different environmental conditions, particular propeller design, hull form, etc.

ISO 8178 test cycles and weighting factors

D2 Test Cycle: Auxiliary engines at a constant speed

Mode Number	1	2	3	4	5
% Speed	100	100	100	100	100
% Power	100	75	50	25	10
Weight Factor	0.05	0.25	0.30	0.30	0,10

E2 Test Cycle: Main propulsion at a constant speed

Mode Number	1	2	3	4	5
% Speed	100	100	100	100	-
% Power	100	75	50	25	-
Weight Factor	0.20	0.50	0.15	0.15	-

Fuel consumption rates are based on ISO3046-1 with a tolerance of +5% and and on natural gas with 37.000 kJ/Nm^3 referred at Normal Conditions (0°C and 1 atm) and methan number >70

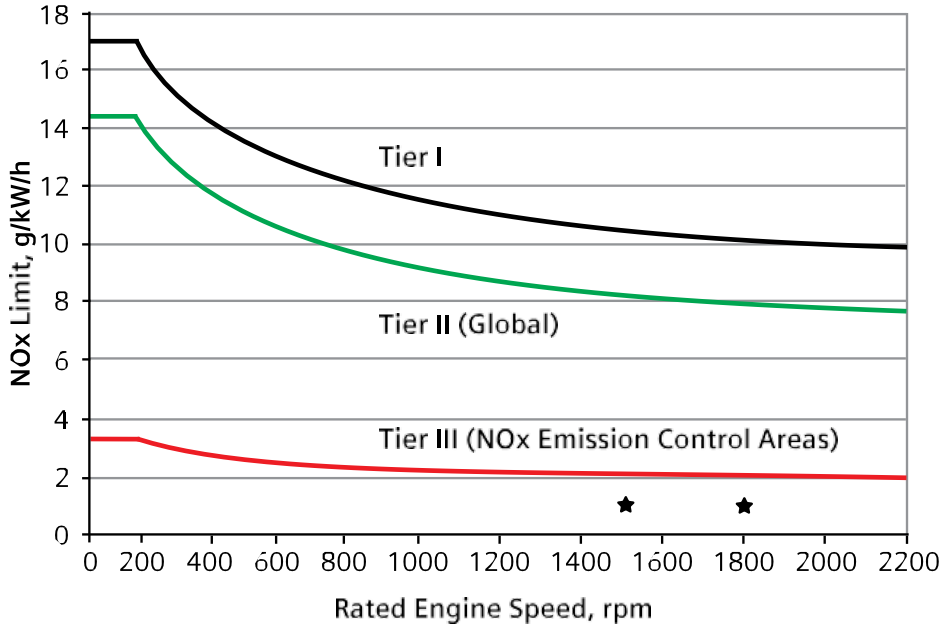
Fuel quality according to Technical Specification IC-G-D-30-001e and IC-G-D-30-052e.

Extensions of this information should be compared with the specifications indicated in the mentioned standards.

2.4 Emission Certifications

IMO (International Maritime Organization)

- On May 12, 2005, annex VI of MARPOL 73 / 78 went into effect for all marine diesel engines above 130 kW / 177 HP installed on vessels based on keel laying and which do not operate exclusively in national waters. Current revision (Tier II) entered into force from January 1, 2011 with a reduction of about 20% in comparison with IMO Tier I. Under IMO Tier III, the NOx emission limits became effective on 1 January 2016 based on keel laying according to speed dependent function with a NOx emission reduction of 80% in comparison with IMO TIER I. This new requirement (IMO Tier III) is only applicable in designated Emission Control Areas (ECAs).



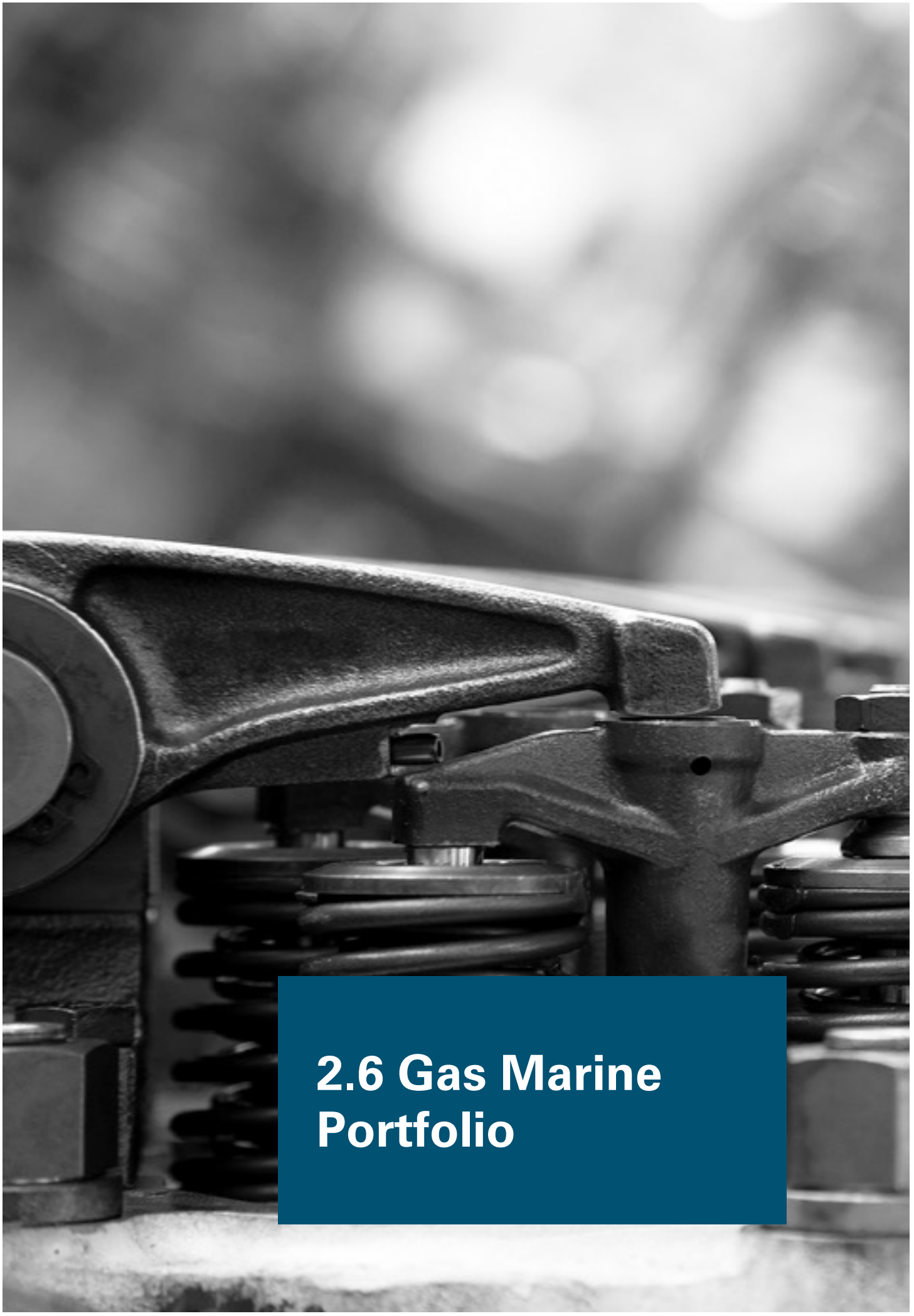
Guascor Energy Gas Marine Engines meet the most restrictive emissions ratios whatever the operation mode would be. The expected NOx emission level at 100% load is 1,48 g/ kWh (500 mg/Nm3). Emissions referred at 5% O2.

2.5 Marine Classification Societies

Guascor Energy gas marine engines and gen-sets are designed and built according to the rules of Bureau Veritas (BV).

For more information on emission or marine classification society certifictions, please contact your local Guascor Energy sales representative.

All information published in this booklet may be modified without prior notice.



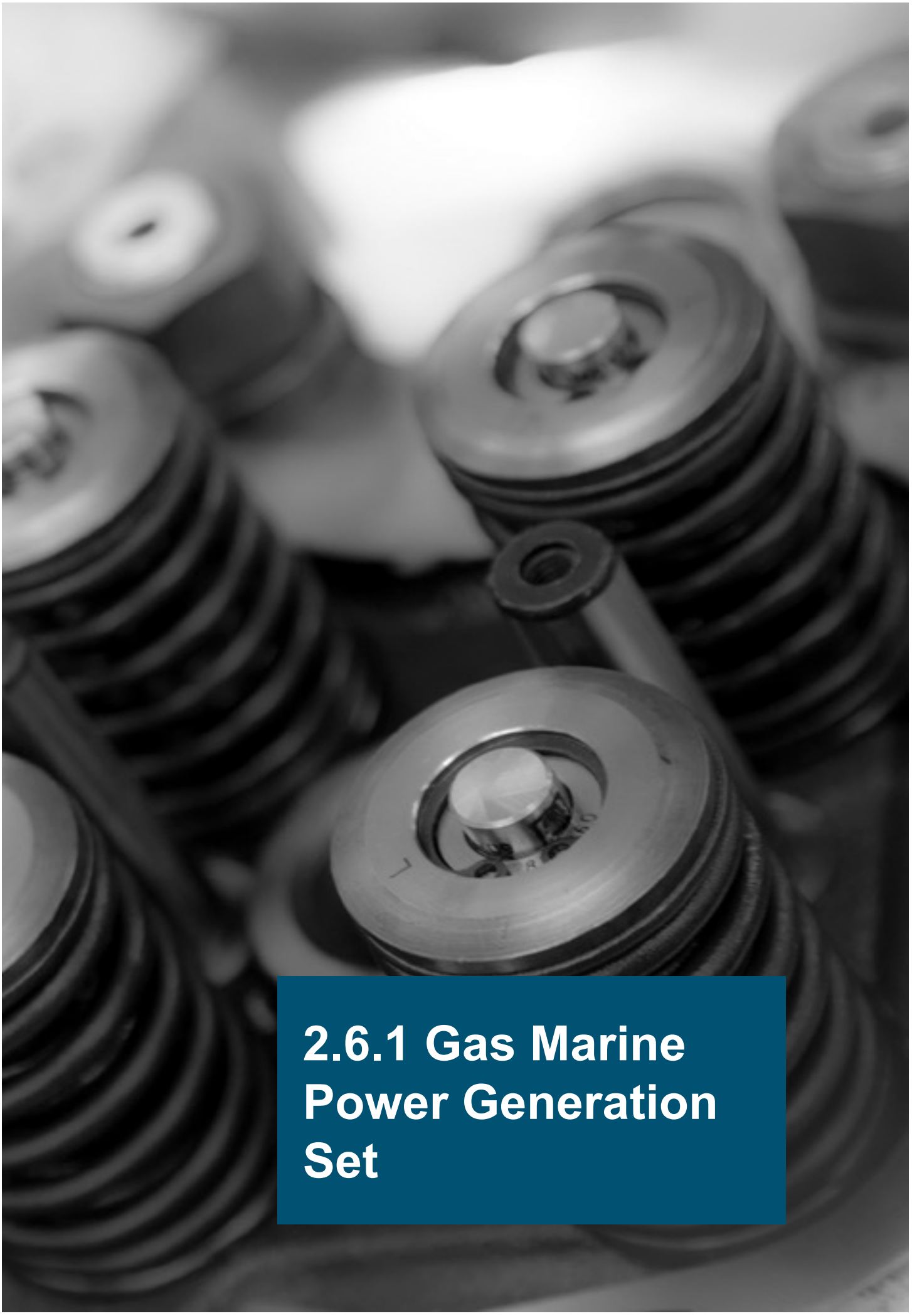
2.6 Gas Marine Portfolio

Power Generation - Constant speed

kVA	kWe	Hz	Type	Rating	Page
320	256	50	G-18SL	COP	74
430	344	50	G-24SL	COP	75
635	508	50	G-36SL	COP	76
860	688	50	G-48SL	COP	77
1.010	808	50	G-56SL	COP	78
350	280	60	G-18SL	COP	74
470	376	60	G-24SL	COP	75
715	572	60	G-36SL	COP	76
955	764	60	G-48SL	COP	77
1.110	888	60	G-56SL	COP	78

Gas Electric Propulsion - Constant speed

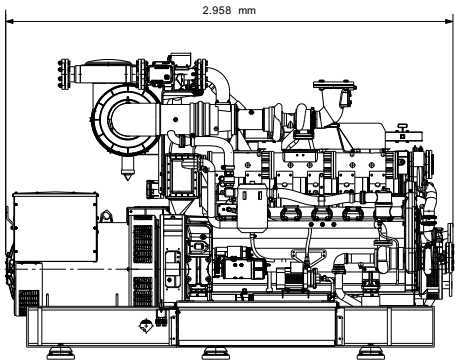
kVA	kWe	Hz	Type	Rating	Page
320	256	50	G-18SL	COP	80
430	344	50	G-24SL	COP	81
635	508	50	G-36SL	COP	82
860	688	50	G-48SL	COP	83
1.010	808	50	G-56SL	COP	84
350	280	60	G-18SL	COP	80
470	376	60	G-24SL	COP	81
715	572	60	G-36SL	COP	82
955	764	60	G-48SL	COP	83
1.110	888	60	G-56SL	COP	84

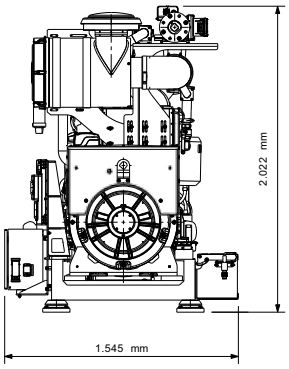


2.6.1 Gas Marine Power Generation Set

G-18SL

Gas Marine Power Generation Set





Main data

Cycle (ISO 8178)	D2 (auxiliary generator set)
Disposition / Displacement	6 L / 17,96 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke Otto
Combustion system	Spark ignited
Generator characteristics	Synchronous
Voltage regulation	AVR electronic
Generator protection	IP23
Heating class	F
Insulation class	H
Construction	Simple bearing

Speed (f)	Electrical power (cosϕ 0,8)		Voltage V	Fuel consumption (ISO 8178)
	kVA	kWe		Nm3/h
1.500 (50Hz)	320	256	380 / 400	46,66
1.800 (60Hz)	350	280	450 / 480	55,00

The engine performance data is valid for a gas of Methane number >70 that fullfills the requirements of the technical specification IC-G-D-30-001e and IC-G-D-052e.

Generated power includes mechanical pumps. Power rating according to ISO 8528 -1.

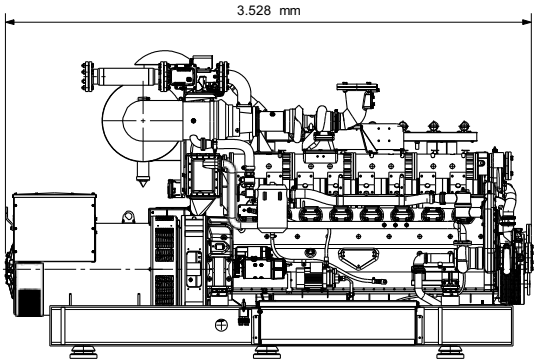
Weight

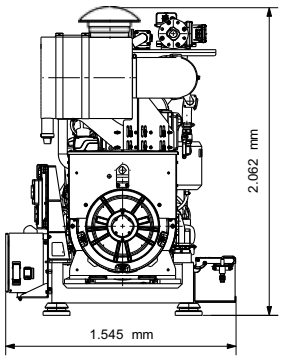
Dry weight (kg)	3.910

Dimensions and weight may vary depending upon engine configuration. Data subject to further modifications without prior notice.

G-24SL

Gas Marine Power Generation Set





Main data

Cycle (ISO 8178)	E2 (electrical propulsion)
Disposition / Displacement	8 L / 23,96 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke diesel
Combustion system	Spark ignited
Generator characteristics	Synchronous
Voltage regulation	AVR electronic
Generator protection	IP23
Heating class	F
Insulation class	H
Construction	Simple bearing

Speed (f)	**Electrical power (cosϕ 0,8)**		**Voltage V**	**Fuel consumption (ISO 8178)**
	kVA	kWe		Nm3/h
1.500 (50Hz)	430	344	380 / 400	61,70
1.800 (60Hz)	470	376	450 / 480	69,86

The engine performance data is valid for a gas of Methane number >70 that fulfills the requirements of the technical specification IC-G-D-30-001e and IC-G-D-052e.

Generated power includes mechanical pumps. Power rating according to ISO 8528 -1.

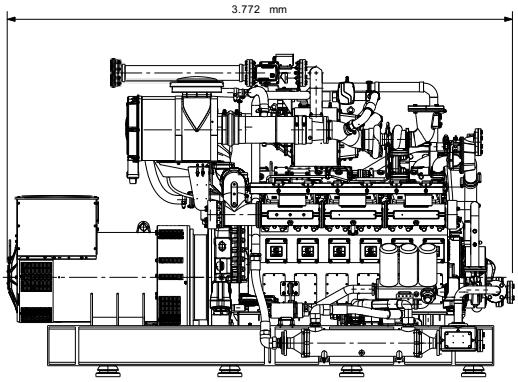
Weight

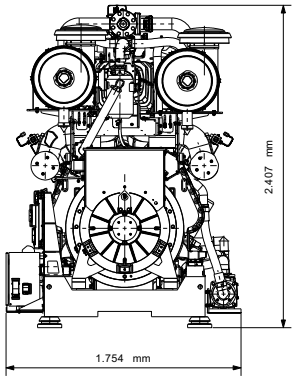
Dry weight (kg)	5.075

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

G-36SL

Gas Marine Power Generation Set





Main data

Cycle (ISO 8178)	E2 (electrical propulsion)
Disposition / Displacement	12 V / 35,93 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke Otto
Combustion system	Spark ignited
Generator characteristics	Synchronous
Voltage regulation	AVR electronic
Generator protection	IP23
Heating class	F
Insulation class	H
Construction	Double bearing

Speed (f)	Electrical power (cosϕ 0,8)		Voltage V	Fuel consumption (ISO 8178)
	kVA	kWe		Nm3/h
1.500 (50Hz)	635	508	380 / 400	91,34
1.800 (60Hz)	715	572	450 / 480	107,85

The engine performance data is valid for a gas of Methane number >70 that fullfills the requirements of the technical specification IC-G-D-30-001e and IC-G-D-052e.

Generated power includes mechanical pumps. Power rating according to ISO 8528 -1.

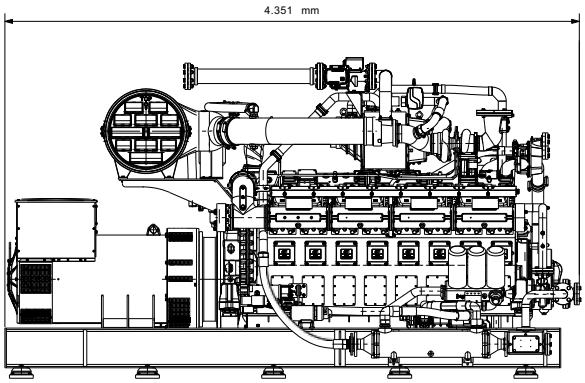
Weight

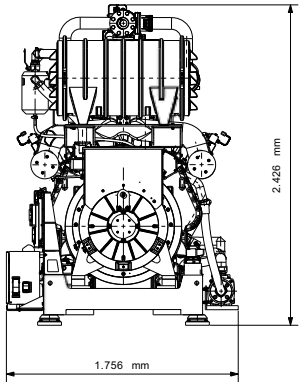
Dry weight (kg)	7.890

Dimensions and weight may vary depending upon engine configuration. Data subject to further modifications without prior notice.

G-48SL

Gas Marine Power Generation Set





Main data

Cycle (ISO 8178)	E2 (electrical propulsion)
Disposition / Displacement	16 V / 47,90 liter
Bore and stroke	152 x 165 mm 4-
Cycle	stroke Otto
Combustion system	Spark ignited
Generator characteristics	Synchronous
Voltage regulation	AVR electronic
Generator protection	IP23
Heating class	F
Insulation class	H
Construction	Double bearing

Speed (f)	Electrical power (cosϕ 0,8)		Voltage V	Fuel consumption (ISO 8178)
	kVA	kWe		Nm3/h
1.500 (50Hz)	860	688	380 / 400	122,01
1.800 (60Hz)	955	764	450 / 480	139,82

The engine performance data is valid for a gas of Methane number >70 that fullfills the requirements of the technical specification IC-G-D-30-001e and IC-G-D-052e.

Generated power includes mechanical pumps. Power rating according to ISO 8528 -1.

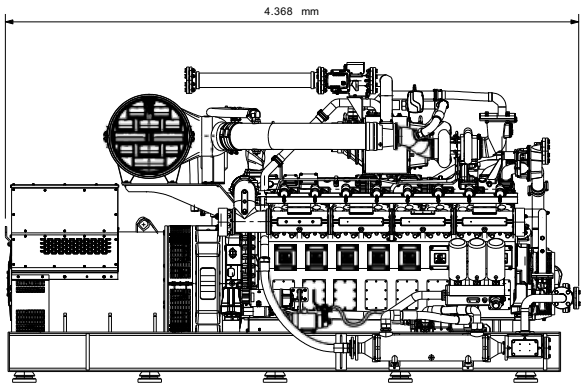
Weight

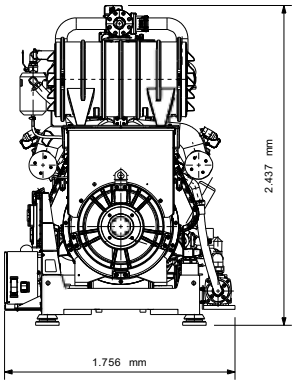
Dry weight (kg)	8.470

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

G-56SL

Gas Marine Power Generation Set





Main data

Cycle (ISO 8178)	E2 (electrical propulsion)
Disposition / Displacement	16 V / 56,00 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke Otto
Combustion system	Spark ignited
Generator characteristics	Synchronous
Voltage regulation	AVR electronic
Generator protection	IP23
Heating class	F
Insulation class	H
Construction	Double bearing

Speed (f)	Electrical power (cosϕ 0,8)		Voltage V	Fuel consumption (ISO 8178)
	kVA	kWe		Nm3/h
1.500 (50Hz)	1.010	808	380 / 400	144,53
1.800 (60Hz)	1.110	888	450 / 480	166,10

The engine performance data is valid for a gas of Methane number >70 that fullfills the requirements of the technical specification IC-G-D-30-001e and IC-G-D-052e.

Generated power includes mechanical pumps. Power rating according to ISO 8528 -1.

Weight

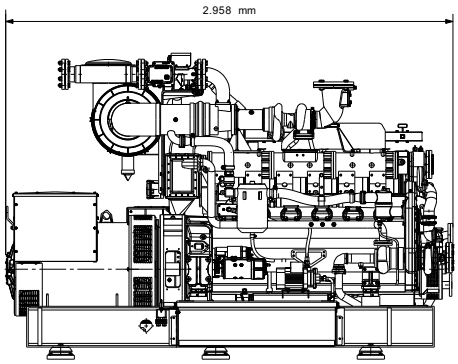
Dry weight (kg)	9.870

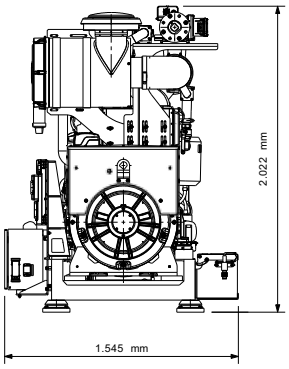
Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

2.6.2 Electric Propulsion Set

G-18SL

Gas Electric Propulsion Set





Main data

Cycle (ISO 8178)	E2 (electric propulsion)
Disposition / Displacement	6 L / 17,96 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke Otto
Combustion system	Spark ignited
Generator characteristics	Synchronous
Voltage regulation	AVR electronic
Generator protection	IP23
Heating class	F
Insulation class	H
Construction	Simple bearing

Speed (f)	Electrical power (cosϕ 0,8)		Voltage V	Fuel consumption (ISO 8178)
	kVA	kWe		Nm3/h
1.500 (50Hz)	320	256	380 / 400	62,16
1.800 (60Hz)	350	280	450 / 480	72,33

The engine performance data is valid for a gas of Methane number >70 that fullfills the requirements of the technical specification IC-G-D-30-001e and IC-G-D-052e.

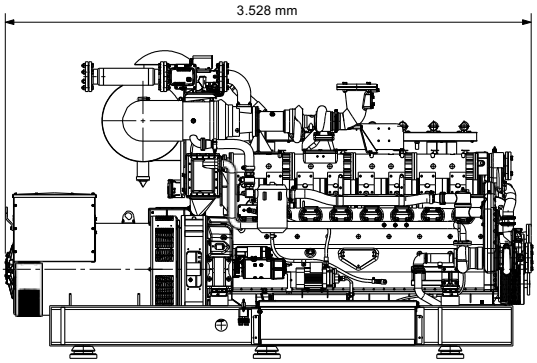
Generated power includes mechanical pumps. Power rating according to ISO 8528 -1.

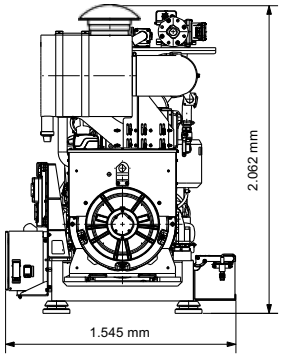
Weight

Dry weight (kg)	3.910

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

G-24SL
Gas Electric Propulsion Set





Main data

Cycle (ISO 8178)	E2 (electric propulsion) 8
Disposition / Displacement	L / 23,96 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke Otto
Combustion system	Spark ignited
Generator characteristics	Synchronous
Voltage regulation	AVR electronic
Generator protection	IP23
Heating class	F
Insulation class	H
Construction	Simple bearing

Speed (f)	Electrical power (cosϕ 0,8)		Voltage V	Fuel consumption (ISO 8178)
	kVA	kWe		Nm3/h
1.500 (50Hz)	430	344	380 / 400	82,88
1.800 (60Hz)	470	376	450 / 480	94,65

The engine performance data is valid for a gas of Methane number >70 that fullfills the requirements of the technical specification IC-G-D-30-001e and IC-G-D-052e.

Generated power includes mechanical pumps. Power rating according to ISO 8528 -1.

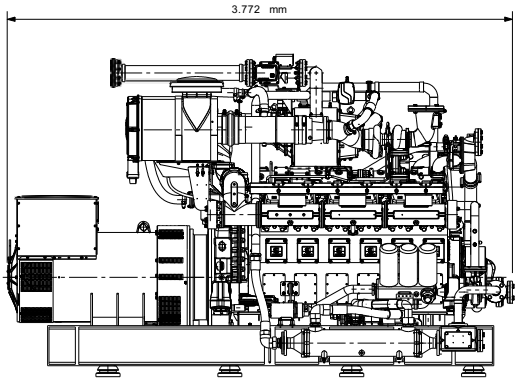
Weight

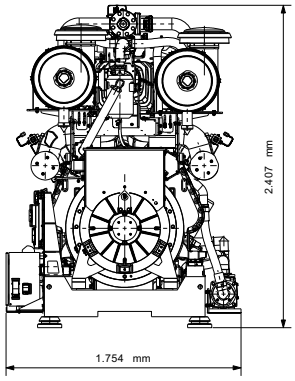
Dry weight (kg)	5.075

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

G-36SL

Gas Electric Propulsion Set





Main data

Cycle (ISO 8178)	E2 (electric propulsion)
Disposition / Displacement	12 V / 35,93 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke Otto
Combustion system	Spark ignited
Generator characteristics	Synchronous
Voltage regulation	AVR electronic
Generator protection	IP23
Heating class	F
Insulation class	H
Construction	Double bearing

Speed (f)	Electrical power (cosϕ 0,8)		Voltage V	Fuel consumption (ISO 8178)
	kVA	kWe		Nm3/h
1.500 (50Hz)	635	508	380 / 400	122,7
1.800 (60Hz)	715	572	450 / 480	143,12

The engine performance data is valid for a gas of Methane number >70 that fullfills the requirements of the technica specification IC-G-D-30-001e and IC-G-D-052e.

Generated power includes mechanical pumps. Power rating according to ISO 8528 -1.

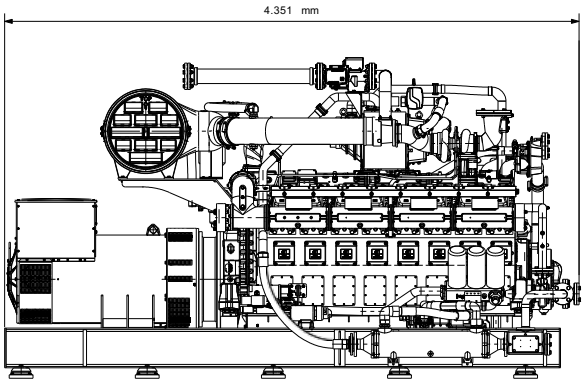
Weight

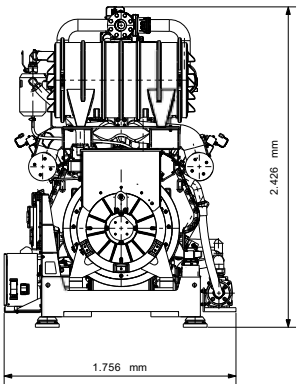
Dry weight (kg)	7.890

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

G-48SL

Gas Electric Propulsion Set





Main data

Cycle (ISO 8178)	E2 (electric propulsion)
Disposition / Displacement	16 V / 47,90 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke Otto
Combustion system	Spark ignited
Generator characteristics	Synchronous
Voltage regulation	AVR electronic
Generator protection	IP23
Heating class	F
Insulation class	H
Construction	Double bearing

Speed (f)	Electrical power (cosϕ 0,8)		Voltage V	Fuel consumption (ISO 8178)
	kVA	kWe		Nm3/h
1.500 (50Hz)	860	688	380 / 400	164,17
1.800 (60Hz)	955	764	450 / 480	189,56

The engine performance data is valid for a gas of Methane number >70 that fullfills the requirements of the technica specification IC-G-D-30-001e and IC-G-D-052e.

Generated power includes mechanical pumps. Power rating according to ISO 8528 -1.

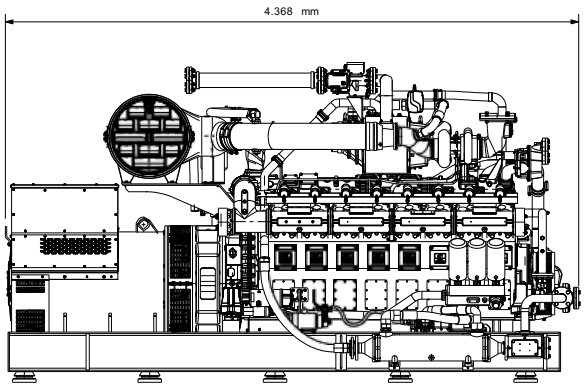
Weight

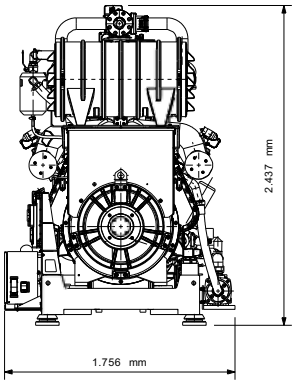
Dry weight (kg)	8.470

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

G-56SL

Gas Electric Propulsion Set





Main data

Cycle (ISO 8178)	E2 (electric propulsion)
Disposition / Displacement	16 V / 56,00 liter
Bore and stroke	152 x 165 mm
Cycle	4-stroke Otto
Combustion system	Spark ignited
Generator characteristics	Synchronous
Voltage regulation	AVR electronic
Generator protection	IP23
Heating class	F
Insulation class	H
Construction	Double bearing

Speed (f)	Electrical power (cosϕ 0,8)		Voltage V	Fuel consumption (ISO 8178)
	kVA	kWe		Nm3/h
1.500 (50Hz)	1.010	808	380 / 400	193,92
1.800 (60Hz)	1.110	888	450 / 480	224,44

The engine performance data is valid for a gas of Methane number >70 that fullfills the requirements of the technica specification IC-G-D-30-001e and IC-G-D-052e.

Generated power includes mechanical pumps. Power rating according to ISO 8528 -1.

Weight

Dry weight (kg)	9.870

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

2.6.3 Marine Control System

Marine Control System

The Guascor Energy Marine Control System has been designed to carry out the functions of monitoring and protection of the engine or genset during its operation.

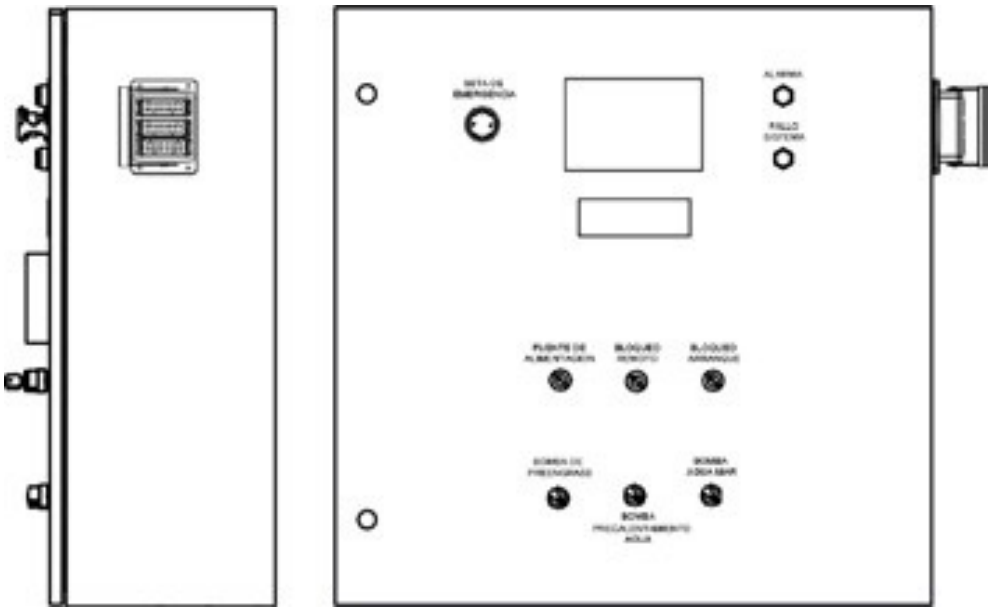
The control device is in charge of the supervision and management of the engine´s main paramenters activating the visual and sound alarms as well as performing the start up and stop functions of the generator set. A backup module is in charge of safety functions such as switching the principal and auxiliary feeds.

Marine Control System - Advance

The Marine Control System - Advance, MCS-Advance, is a totally programmable control panel controlled by a specific control device, ECU-MARINE . This equipment performs the functions of monitoring and protecting the engine or genset, displaying the main parameters, activating the visual and sound alarms and performing the start up and spot functions of the machine.

As an option, the MCS-Advance would be completed with an external display device to be installed remotely.

The MCS - Advance complies with the demanded requirements of the different Classification Entities, such Bureau Veritas, Lloyds Register or American Bureau of Shipping.



2.7 Unit Equivalences for Conversion

Power

1 W = 1VA = 1J/s = 1 Nm/s
1 kW = 1.360 metric HP (DIN)
1 kW = 1.341 HP (UK-USA)
1 HP (UK-USA) = 1.0138 metric HP (DIN)
1 HP (DIN) = 0.7355 kW
1HP (UK-USA) = 0.7457 kW
1 HP (DIN) = 0.9863 HP (UK-USA)

Torque

1 Nm = 0.102 mkg
1 Nm = 0.7376 ft.lbF
1 Nm = 8.8495 in.lbF
1 mkg = 9.81 Nm
1 ft.lbF = 1.356 Nm
1 ft.lbF = 0.113 Nm

Mass

1 g = 0.035 oz (ounce)
1 kg = 2.2046 lb (pound)
1 met ton = 1.100 ton
1 oz = 28.5 g
1 lb = 0.4536 kg
1 ton = 0.909 metric ton

Consumption

g/HPh = g/gkWh x 0.7355
g/kWh = g/HPh x 1.360

Temperature

1°C = 5/9 x (t(F°)-32)
1°K = t(°C) + 273,15
1°F = 9/5 x (t(°C) + 32)
1°C = t(°K) - 273,15

Volume

1 l = 0.26 gallon (US)
1 l = 0.21 gallon (UK)
1 gal (US) = 3.78541 liter
1 gal (UK) = 4.54609 liter

Length

1 mm = 0.03937 in (Inch)
1 m = 1.0936 yd
1 m = 3.28 ft (Feet)
1 km = 0.535 Nautical Mile
1 km = 0.621 Statute Mile
1 in = 25.4 mm
1 yd = 0.9144 m
1 ft = 304.8 mm
1 NM = 1852 m
1 SM = 1609.344 m

Energy

1J = 1Nm - 1Ws - 1VAs
1kcal = 4186.8 J
1 J = 0.00023 kcal

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