

Medium-speed generating sets

# PORTFOLIO



## RELIABLE AND FLEXIBLE POWER

**Rolls-Royce medium-speed liquid fuel and gas generating sets deliver reliable power with low operating costs.**

Bergen Engines AS has delivered high performance medium-speed engines since 1946, both to marine and land applications. We pioneered the power generation market with our first lean-burn gas engine already in 1992. Today, we are a leading supplier of medium speed liquid fuel and gas engines, supporting your business with reliable, engine-based power generation solutions from 1.400 to 11.830 kWe per engine, and complete power systems of 200 MWe and beyond.

We offer a wide and highly economical product range with world class electrical efficiency of up to 50% in open cycle. Our power solutions are ideal for baseload, grid support, peaking and for hybrid power systems. Lead time is short, and no extensive on-site construction is required. The fast reacting medium speed engines can ramp up from zero to full load in 3 minutes, and

maintenance intervals are not affected by the number of starts and stops. This makes them a perfect match for variable renewable power that needs balancing back-up power.

As the concept is modular, additional generator sets can quickly be added if the total power demand should stabilise at a higher level. In a combined heat and power configuration the total efficiency can reach more than 95 percent. And by installing a heat recovery system and steam turbine, power production can be increased by up to eight percent with no additional fuel consumption. We also support you with a diverse range of flexible service solutions throughout the entire product lifecycle. Our digital solutions make equipment monitoring easier. Real-time data gathering and analysis ensures that many technical problems can be either predicted and prevented, or solved swiftly by our technical support team. Remote troubleshooting by technical support is an excellent way to reduce operational costs and maintain maximum availability.

## Broad scope and capability

- Fuel efficient and flexible gas and diesel engines
- Integrated power plant solutions based on modular systems, delivering reliable power
- Multi-unit power plant concept that maximises plant availability
- Power plant design and project management
- Partnering for turnkey installation
- Long term service agreements and plant operations experience
- Export finance

## WHY CHOOSE MEDIUM-SPEED FOR POWER GENERATION?



Low emissions and quick ramp up and ramp down times to support grid fluctuations and variable renewables generation

---



Small footprint, with possibility to locate the power plant in remote places to support incomplete grids or in high demand areas such as big cities

---



Minimal derating due to variations in temperature, altitude and part load operation

---



Low capital investment that can be done gradually as power demand rises, with short payback time

---



Cost efficient and predictable maintenance that ensures low operational costs

---



Quick delivery and installation

## GENERAL CONDITIONS

Definition of engine power and performance data is in accordance with ISO 3046-1, ISO 8528-1 and ISO 15550. Engine and generator performance may be adjusted in accordance with application, site conditions, load profile and fuel type.

### Natural gas operation

Reference fuel for gas engines has a lower heating value (LHV) of 36MJ/Nm<sup>3</sup> and methane number of >80.

### Liquid fuel operation

Specific fuel oil consumption is based on diesel oil (MDO) with a net heating value of 42.7 MJ/kg and two engine driven pumps.

### Heavy fuel oil operation

The engines are designed for operations on heavy fuel oil with viscosity up to 700 cSt at 50 °C within ISO 8217.

### Emissions

Engine exhaust emission levels are below the limits for engine driven power plants, as stated in the World Bank Group's Pollution prevention and abatement handbook.

### Heat recovery

Data for arranging heat recovery is available upon request.

### Dimensions

All dimensions are in mm.

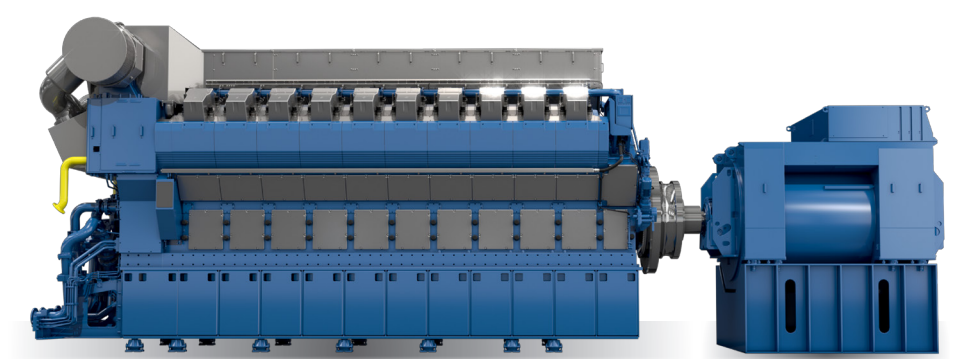
Dimensions and weights are given for guidance purposes only and are based on a typical specification. For detailed information please contact Bergen Engines.

### Note

Due to continuous development, some data may change.



# NATURAL GAS GENERATING SETS



Cylinder diameter 360 mm, piston stroke 450 mm

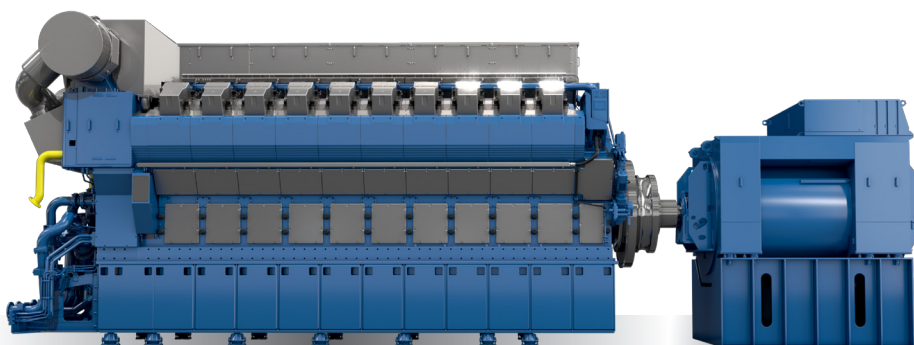
Weight and dimitentions	Weight kg	Length	Width	Height
B36:45V12 AG	100000	11716	3280	4980
B36:45V16 AG	150000	12996	3783	4980
B36:45V20 AG	170000	14276	3783	4980
Technical data	Unit	B36:45V12AG	B36:45V16AG	B36:45V20AG
Number of cylinders		12	16	20
Engine speed	r/min	750	750	750
Electrical output	kW	7090	9470	11830
Charge air cooler HT	kW	1600	2140	2715
Charge air cooler LT	kW	350	470	625
Lube oil cooler	kW	840	1120	1135
Jacket water cooler	kW	1000	1320	1260
Exhaust mass	kg/h	38500	51400	62400
Exhaust gas temperature	°C	375	375	375
Nom. el. efficiency	%	49	49.5	50

- Depending on type of generator the weight, dimensions and performance may change
- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition and fuel gas consumption are according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Reference fuel is natural gas with a lower heating value of 36MJ/nm³, methane number >80
- Minimum fuel gas pressure to the gas regulating module: 5.3 barg
- Due to continuous development some data may change

## Gas generating sets

## B36:45V AG

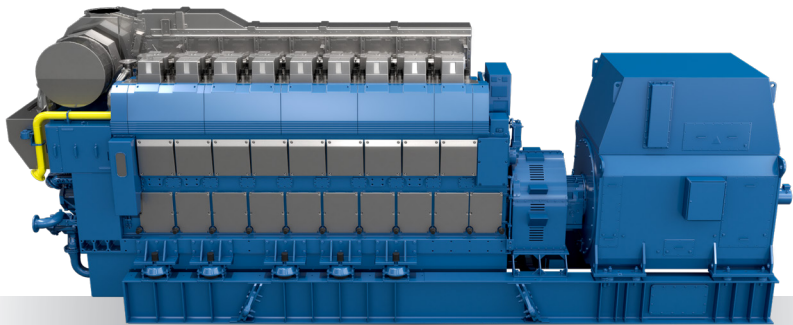
60 Hz



Cylinder diameter 360 mm, piston stroke 450 mm

Weight and dimensions	Weight kg	Length	Width	Height
B36:45V12 AG	100000	11716	3280	4980
B36:45V16 AG	150000	12996	3783	4980
B36:45V20 AG	170000	14276	3783	4980
Technical data	Unit	B36:45V12AG	B36:45V16AG	B36:45V20AG
Number of cylinders		12	16	20
Engine speed	r/min	720	720	720
Electrical output	kW	6800	9070	11340
Charge air cooler HT	kW	1540	2050	2620
Charge air cooler LT	kW	340	450	500
Lube oil cooler	kW	810	1070	1330
Jacket water cooler	kW	950	1260	1580
Exhaust mass	kg/h	36900	49200	61500
Exhaust gas temperature	°C	375	375	375
Nom. el. efficiency	%	48.9	49.4	49.9

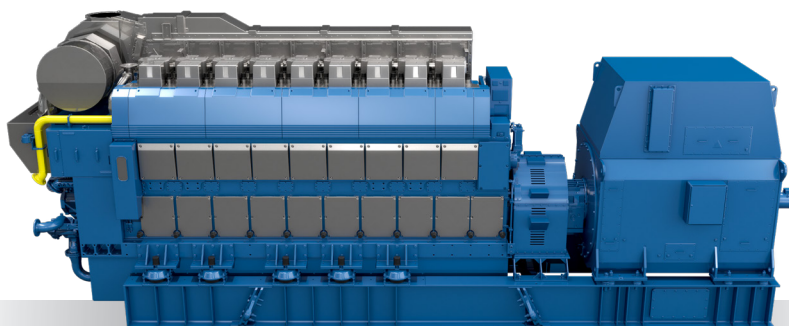
- Depending on type of generator the weight, dimensions and performance may change
- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition and fuel gas consumption are according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Reference fuel is natural gas with a lower heating value of 36MJ/nm<sup>3</sup>, methane number >80
- Minimum fuel gas pressure to the gas regulating module: 5.3 barg
- Due to continuous development some data may change



Cylinder diameter 360 mm, piston stroke 450 mm

Weight and dimentions	Weight kg	Length	Width	Height
B36:45L6 AG	67000	9800	2800	3890
B36:45L8 AG	87500	10240	3000	4170
B36:45L9 AG	88000	11250	3400	4170
Technical data	Unit	B36:45L6AG	B36:45L8AG	B36:45L9AG
Number of cylinders		6	8	9
Engine speed	r/min	750	750	750
Electrical output	kW	3520	4700	5290
Charge air cooler HT	kW	810	1080	1085
Charge air cooler LT	kW	225	300	400
Lube oil cooler	kW	360	475	625
Jacket water cooler	kW	455	605	790
Exhaust mass	kg/h	18800	25100	28200
Exhaust gas temperature	°C	375	375	375
Nom. el. efficiency	%	48.5	48.7	48.9

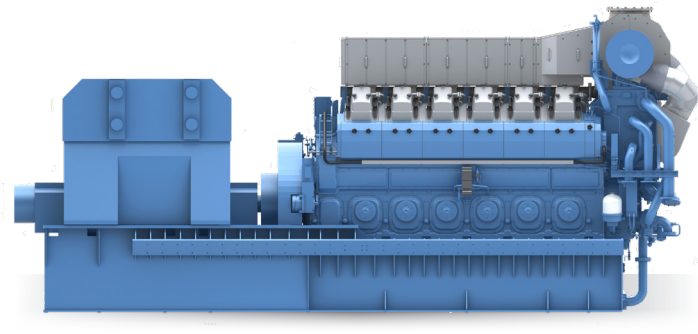
- Depending on type of generator the weight, dimensions and performance may change
- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition and fuel gas consumption are according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Reference fuel is natural gas with a lower heating value of 36MJ/nm³, methane number >80
- Minimum fuel gas pressure to the gas regulating module: 5.3 barg
- Due to continuous development some data may change



Cylinder diameter 360 mm, piston stroke 450 mm

Weight and dimensions	Weight kg	Length	Width	Height
B36:45L6 AG	67000	9800	2800	3890
B36:45L8 AG	87500	10240	3000	4170
B36:45L9 AG	88000	11250	3400	4170
Technical data	Unit	B36:45L6AG	B36:45L8AG	B36:45L9AG
Number of cylinders		6	8	9
Engine speed	r/min	720	720	720
Electrical output	kW	3370	4500	5070
Charge air cooler HT	kW	720	970	1080
Charge air cooler LT	kW	220	270	320
Lube oil cooler	kW	400	540	610
Jacket water cooler	kW	480	640	720
Exhaust mass	kg/h	18500	24600	27700
Exhaust gas temperature	°C	375	375	375
Nom. el. efficiency	%	48.4	48.6	48.9

- Depending on type of generator the weight, dimensions and performance may change
- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition and fuel gas consumption are according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Reference fuel is natural gas with a lower heating value of 36MJ/nm<sup>3</sup>, methane number >80
- Minimum fuel gas pressure to the gas regulating module: 5.3 barg
- Due to continuous development some data may change



Cylinder diameter 350 mm, piston stroke 400 mm

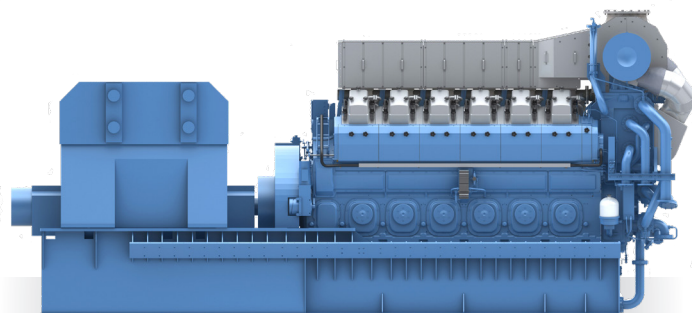
Weight and dimentions	Weight kg	Length	Width	Height
B35:40V12 AG2	99000	10575	2750	4620
B35:40V16 AG2	116000	11565	3306	4545
B35:40V20 AG2	137000	13160	3306	4700
Technical data	Unit	B35:40V12AG2	B35:40V16AG2	B35:40V20AG2
Number of cylinders		12	16	20
Engine speed	r/min	750	750	750
Electrical output	kW	5635	7540	9445
Charge air cooler HT	kW	925	1355	1660
Charge air cooler LT	kW	375	510	630
Lube oil cooler	kW	575	760	950
Jacket water cooler	kW	730	965	1205
Exhaust mass	kg/h	30900	41200	50600
Exhaust gas temperature	°C	395	375	375
Nom. el. efficiency	%	48.3	48.8	49.0

- Depending on type of generator the weight, performance and dimensions may change
- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition and fuel gas consumption are according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Reference fuel is natural gas with a lower heating value of 36MJ/nm3, methane number >80
- Minimum fuel gas pressure to the gas regulating module: 4,5 barg
- Due to continuous development some data may change

## Gas generating sets

## B35:40V AG2

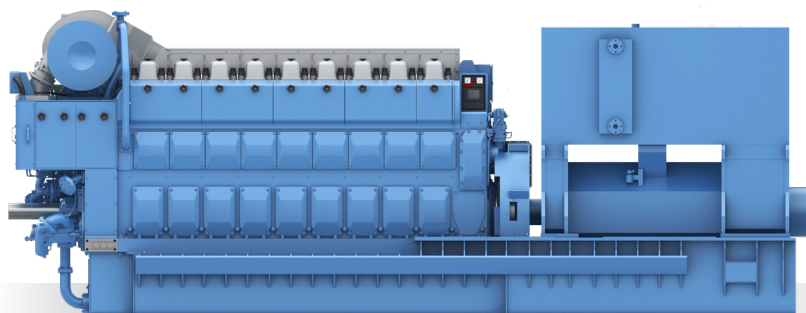
60 Hz



Cylinder diameter 350 mm, piston stroke 400 mm

Weight and dimensions	Weight kg	Length	Width	Height
B35:40V12 AG2	99000	10575	2750	4620
B35:40V16 AG2	116000	11565	3306	4545
B35:40V20 AG2	137000	13160	3306	4700
Technical data	Unit	B36:45V12A	B36:45V16A	B36:45V20A
Number of cylinders		12	16	20
Engine speed	r/min	720	720	720
Electrical output	kW	5415	7235	9070
Charge air cooler HT	kW	885	1305	1590
Charge air cooler LT	kW	360	490	605
Lube oil cooler	kW	550	730	915
Jacket water cooler	kW	700	925	1155
Exhaust mass	kg/h	29700	39600	48600
Exhaust gas temperature	°C	395	355	360
Nom. el. efficiency	%	48.3	48.8	49.0

- Depending on type of generator the weight, performance and dimensions may change
- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition and fuel gas consumption are according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Reference fuel is natural gas with a lower heating value of 36MJ/nm<sup>3</sup>, methane number >80
- Minimum fuel gas pressure to the gas regulating module: 4,5 barg
- Due to continuous development some data may change



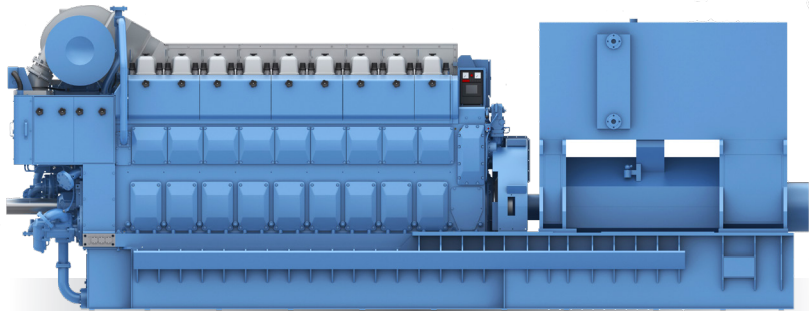
Cylinder diameter 260 mm, piston stroke 330 mm

Weight and dimensions	Weight kg	Length	Width	Height
C26:33L6 AG	34000	7170	2080	3400
C26:33L9 AG	38700	8460	2080	3400
Technical data	Unit		C26:33L6 AG	C26:33L9 AG
Number of cylinders			6	9
Engine speed	r/min		1000	1000
Electrical output	kW		1565	2355
Charge air cooler HT	kW		240	360
Charge air cooler LT	kW		120	185
Lube oil cooler	kW		235	355
Jacket water cooler	kW		250	375
Exhaust mass	kg/h		9100	13600
Exhaust gas temperature	°C		405	365
Nom. el. efficiency	%		46.1	46.3

- Depending on type of generator the weight, performance and dimensions may change
- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition and fuel gas consumption are according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Reference fuel is natural gas with a lower heating value of 36MJ/nm<sup>3</sup>, methane number >80
- Minimum fuel gas pressure to the gas regulating module: 3.5 barg
- Due to continuous development some data may change

Gas generating sets  
C26:33L AG

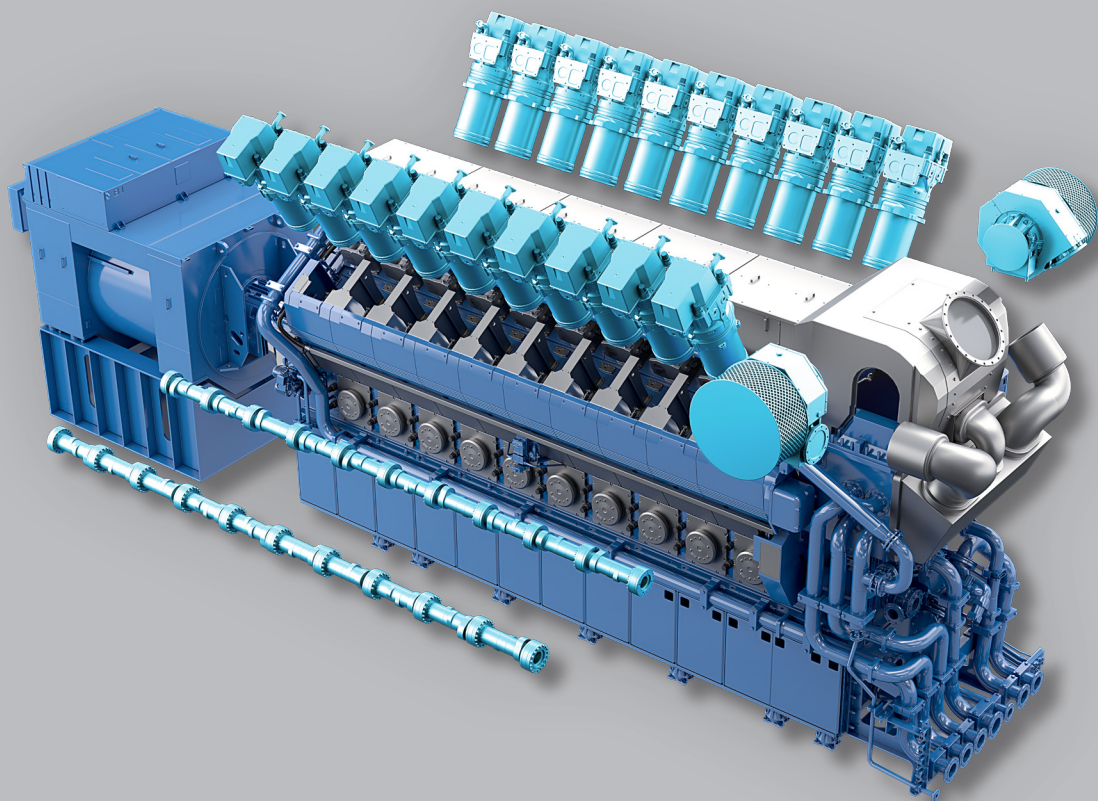
60 Hz



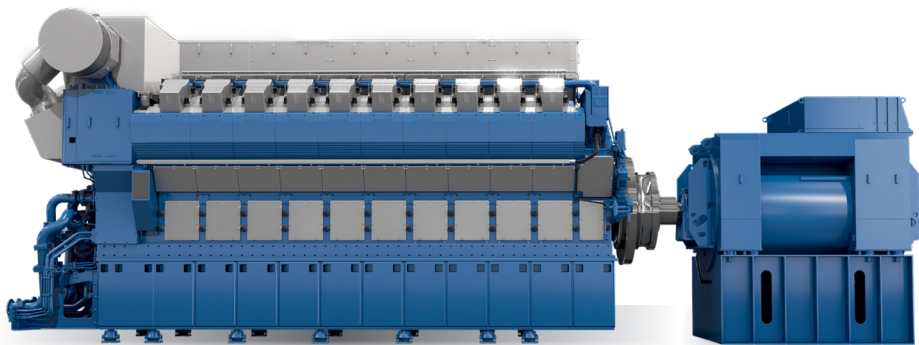
Cylinder diameter 260 mm, piston stroke 330 mm

Weight and dimentions	Weight kg	Length	Width	Height
C26:33L6 AG	34000	7170	2080	3400
C26:33L9 AG	38700	8460	2080	3400
Technical data	Unit	C26:33L6 AG		C26:33L9 AG
Number of cylinders		6		9
Engine speed	r/min	900		900
Electrical output	kW	1410		2125
Charge air cooler HT	kW	215		325
Charge air cooler LT	kW	110		165
Lube oil cooler	kW	215		320
Jacket water cooler	kW	225		340
Exhaust mass	kg/h	8100		12300
Exhaust gas temperature	°C	405		365
Nom. el. efficiency	%	46.0		46.3

- Depending on type of generator the weight, performance and dimensions may change
- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition and fuel gas consumption are according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Reference fuel is natural gas with a lower heating value of 36MJ/nm<sup>3</sup>, methane number >80
- Minimum fuel gas pressure to the gas regulating module: 3.5 barg
- Due to continuous development some data may change



# LIQUID FUEL GENERATING SETS



Cylinder diameter 330 mm, piston stroke 450 mm

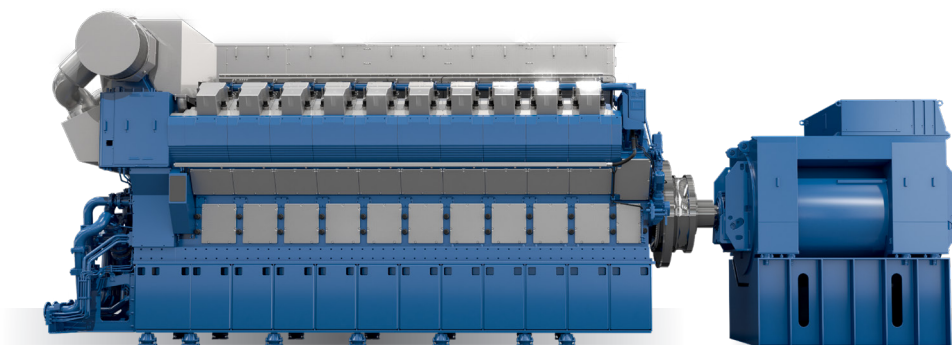
Weight and dimitentions	Weight kg	Length	Width	Height
B33:45V12 A	100000	11716	3280	4980
B33:45V16 A	150000	12996	3783	4980
B33:45V20 A	170000	14276	3783	4980
Technical data	Unit	B33:45V12A	B33:45V16A	B33:45V20A
Number of cylinders		12	16	20
Engine speed	r/min	750	750	750
Electrical output	kW	6380	8520	10650
Charge air cooler HT	kW	1810	2410	3090
Charge air cooler LT	kW	400	530	590
Lube oil cooler	kW	780	1030	1290
Jacket water cooler	kW	920	1220	1520
Exhaust mass	kg/h	43400	57900	72400
Exhaust gas temperature	°C	300	300	300
Nom. el. efficiency	%	48	48.3	48.3

- Depending on type of generator the weight, performance and dimensions may change
- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition is according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Specific fuel oil consumption is measured at test bed according to ISO 3046-1, using diesel oil with a net heating value of 42.7 MJ/kg
- Due to continuous development some data may change

## Liquid fuel generating sets

## B33:45V A

60 Hz



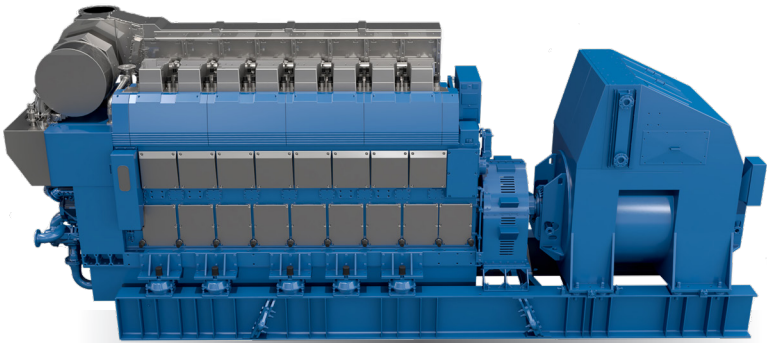
Cylinder diameter 330 mm, piston stroke 450 mm

Weight and dimensions	Weight kg	Length	Width	Height
B33:45V12 A	100000	11716	3280	4980
B33:45V16 A	150000	12996	3783	4980
B33:45V20 A	170000	14276	3783	4980
Technical data	Unit	B33:45V12A	B33:45V16A	B33:45V20A
Number of cylinders		12	16	20
Engine speed	r/min	720	720	720
Electrical output	kW	6380	8520	10650
Charge air cooler HT	kW	1810	2410	3090
Charge air cooler LT	kW	400	530	590
Lube oil cooler	kW	780	1030	1290
Jacket water cooler	kW	920	1220	1520
Exhaust mass	kg/h	43400	57900	72400
Exhaust gas temperature	°C	300	300	300
Nom. el. efficiency	%	47.9	48.1	48.2

- Depending on type of generator the weight, performance and dimensions may change
- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition is according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Specific fuel oil consumption is measured at test bed according to ISO 3046-1, using diesel oil with a net heating value of 42.7 MJ/kg
- Due to continuous development some data may change

B33:45L A

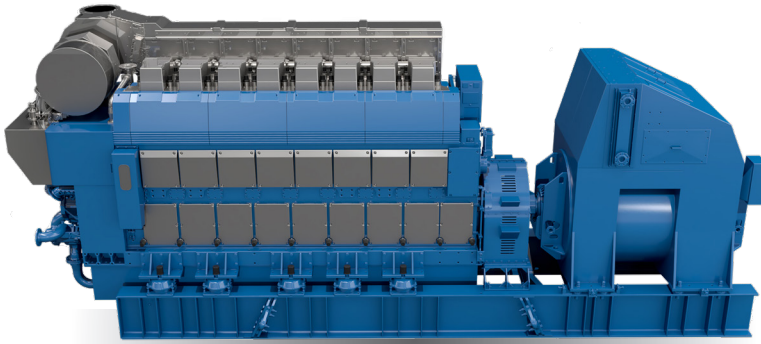
50 Hz



Cylinder diameter 330 mm, piston stroke 450 mm

Weight and dimentions	Weight kg	Length	Width	Height
B33:45L6 A	66200	9280	2600	4110
B33:45L8 A	87500	10240	3000	4260
B33:45L9 A	92400	11250	3400	4170
Technical data	Unit	B33:45L6 A	B33:45L8 A	B33:45L9 A
Number of cylinders		6	8	9
Engine speed	r/min	750	750	750
Electrical output	kW	3170	4230	4760
Charge air cooler HT	kW	850	1150	1280
Charge air cooler LT	kW	250	320	400
Lube oil cooler	kW	390	520	580
Jacket water cooler	kW	460	610	690
Exhaust mass	kg/h	21700	28900	32600
Exhaust gas temperature	°C	300	300	300
Nom. el. efficiency	%	47.7	47.7	47.7

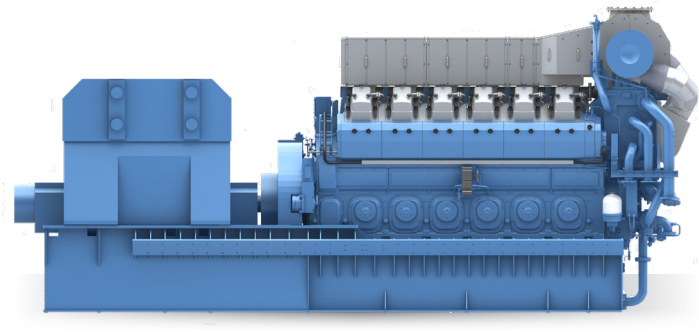
- Depending on type of generator the weight, performance and dimensions may change
- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition is according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Specific fuel oil consumption is measured at test bed according to ISO 3046-1, using diesel oil with a net heating value of 42.7 MJ/kg
- Due to continuous development some data may change



Cylinder diameter 330 mm, piston stroke 450 mm

Weight and dimensions	Weight kg	Length	Width	Height
B33:45L6 A	66200	9280	2600	4110
B33:45L8 A	87500	10240	3000	4260
B33:45L9 A	92400	11250	3400	4170
Technical data	Unit	B33:45L6 A	B33:45L8 A	B33:45L9 A
Number of cylinders		6	8	9
Engine speed	r/min	720	720	720
Electrical output	kW	3170	4220	4760
Charge air cooler HT	kW	850	1150	1280
Charge air cooler LT	kW	250	320	380
Lube oil cooler	kW	390	520	580
Jacket water cooler	kW	460	610	690
Exhaust mass	kg/h	21700	28900	32600
Exhaust gas temperature	°C	300	300	300
Nom. el. efficiency	%	47.6	47.6	47.7

- Depending on type of generator the weight, performance and dimensions may change
- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition is according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Specific fuel oil consumption is measured at test bed according to ISO 3046-1, using diesel oil with a net heating value of 42.7 MJ/kg
- Due to continuous development some data may change



Cylinder diameter 320 mm, piston stroke 400 mm

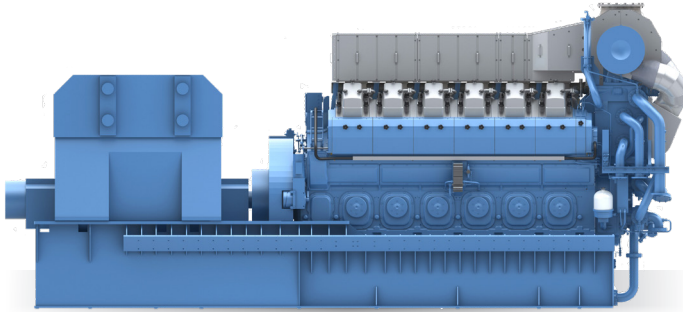
Weight and dimentions	Weight kg	Length	Width	Height
B32:40V12 A2	96000	10575	2750	4620
B32:40V16 A2	115000	11565	3306	4545
Technical data	Unit		B32:40V12 A2	B32:40V16 A2
Number of cylinders			12	16
Engine speed	r/min		750	750
Electrical output	kW		5280	7055
Charge air cooler HT	kW		1205	1570
Charge air cooler LT	kW		500	655
Lube oil cooler	kW		660	865
Jacket water cooler	kW		860	1120
Exhaust mass	kg/h		38600	51600
Exhaust gas temperature	°C		315	315
Nom. el. efficiency	%		44.8	45.9

- Depending on type of generator the weight, performance and dimensions may change
- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition is according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Specific fuel oil consumption is measured at test bed according to ISO 3046-1, using diesel oil with a net heating value of 42.7 MJ/kg
- Due to continuous development some data may change

## Liquid fuel generating sets

## B32:40V A2

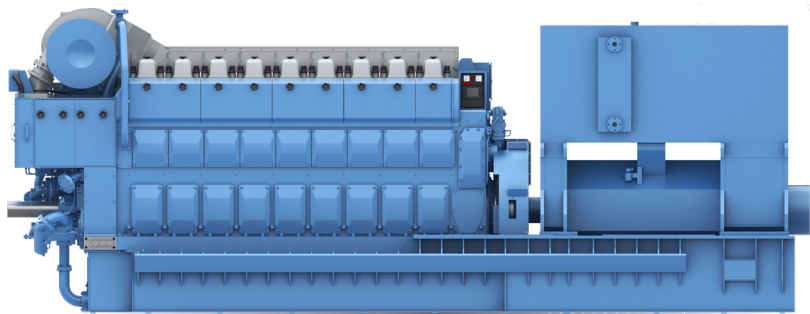
60 Hz



Cylinder diameter 320 mm, piston stroke 400 mm

Weight and dimensions	Weight kg	Length	Width	Height
B32:40V12 A2	96000	10550	2650	4220
B32:40V16 A2	115000	12000	2650	4220
Technical data	Unit	B32:40V12 A2		B32:40V16 A2
Number of cylinders		12		16
Engine speed	r/min	720		720
Electrical output	kW	5070		6775
Charge air cooler HT	kW	1150		1500
Charge air cooler LT	kW	480		625
Lube oil cooler	kW	630		825
Jacket water cooler	kW	820		1070
Exhaust mass	kg/h	37100		49500
Exhaust gas temperature	°C	315		315
Nom. el. efficiency	%	45.0		46.1

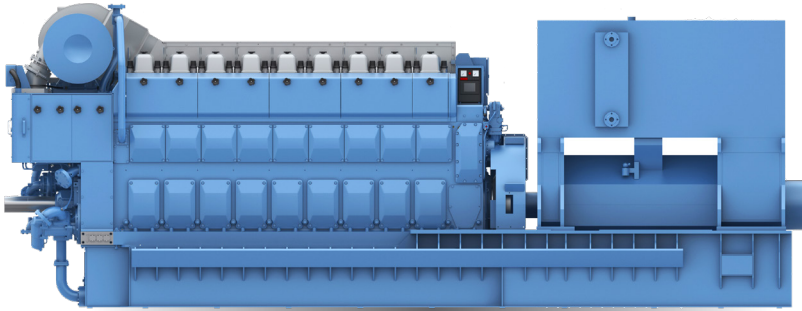
- Depending on type of generator the weight, performance and dimensions may change
- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition is according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Specific fuel oil consumption is measured at test bed according to ISO 3046-1, using diesel oil with a net heating value of 42.7 MJ/kg
- Due to continuous development some data may change



Cylinder diameter 250 mm, piston stroke 330 mm

Weight and dimentions	Weight kg	Length	Width	Height
C25:33L6 A2	34000	7170	2080	3400
C25:33L8 A2	37130	8030	2080	3400
C25:33L9 A2	38700	8460	2080	3400
Technical data	Unit	C25:33L6 A2	C25:33L8 A2	C25:33L9 A2
Number of cylinders		6	8	9
Engine speed	r/min	1000	1000	1000
Electrical output	kW	1565	2095	2355
Charge air cooler HT	kW	385	515	580
Charge air cooler LT	kW	175	235	265
Lube oil cooler	kW	250	335	375
Jacket water cooler	kW	250	335	375
Exhaust mass	kg/h	11700	15600	17600
Exhaust gas temperature	°C	325	325	325
Nom. el. efficiency	%	43.8	44.0	44.0

- Depending on type of generator the weight, performance and dimensions may change
- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition is according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Specific fuel oil consumption is measured at test bed according to ISO 3046-1, using diesel oil with a net heating value of 42.7 MJ/kg
- Due to continuous development some data may change



Cylinder diameter 250 mm, piston stroke 330 mm

Weight and dimensions	Weight kg	Length	Width	Height
C25:33L6 A2	34000	7170	2080	3400
C25:33L8 A2	37130	8030	2080	3400
C25:33L9 A2	38700	8460	2080	3400
Technical data	Unit	C25:33L6 A2	C25:33L8 A2	C25:33L9 A2
Number of cylinders		6	8	9
Engine speed	r/min	900	900	900
Electrical output	kW	1565	2095	2355
Charge air cooler HT	kW	410	545	615
Charge air cooler LT	kW	180	245	275
Lube oil cooler	kW	225	305	340
Jacket water cooler	kW	245	325	365
Exhaust mass	kg/h	11300	15000	16900
Exhaust gas temperature	°C	315	315	315
Nom. el. efficiency	%	44.7	44.0	44.9

- Depending on type of generator the weight, performance and dimensions may change
- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition is according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Specific fuel oil consumption is measured at test bed according to ISO 3046-1, using diesel oil with a net heating value of 42.7 MJ/kg
- Due to continuous development some data may change

