GOLDEN MAJD Co.

1500 - 1650S

Rating @ 0.8 PF		Prime rating	Stand-by rating
Voltage *1	Freq. *2	PT1500 *3	PT1650S *4
400 V	50 Hz	1508 KVA	1658 KVA
480 V	60 Hz	1512 KVA	1663 KVA

The above ratings represent the generating set capability guarantied within ±3% at the references conditions equivalent to those specified in ISO 8528/1, ISO 3046/1 and BS 5514/1

NOTES

1 - The applicable voltage range is 380V to 415V for 50Hz applications and 380V to 480V for 60Hz applications.
2 - This generating set is of fixed speed of 1500rpm or 1800rpm.
3 - **PT1500** is the prime power rating of the generating set, where a variable load and unlimited hours usage are applied on the generating set with an average load factor of 80% of the prime rating over each 24 hour period. Noting that a 10% overload is available for 1 hour in every 12 hours operation.
4 - **PT1650S** is the standby power rating of the generating set, where a variable load limited to an annual usage up to 500 hours is applied, with 300 hours of which may be continuous running. Noting that no overload is permitted.

Engine Technical Data		
Model	Perkins 4012TAG2A/4012TAG2	
Cylinders	12; 60° Vee Form	
Aspiration	Turbocharged & A/A charge-cooled	
Combustion	Direct injection	
Cooling System	Water cooled	
Displacement	45.842 L	
Oil consumption	0.51 g / KWhr	
Lube oil capacity	159.0 L	
Coolant capacity	235 L	
Governor	Electronic	
Emissions regulations	TA-Luft (1986)	
Speed	1500 rpm	1800 rpm
Fuel Consumption PT1500	306.0 L/H	317 L/H
Fuel Consumption PT1650S	345.0 L/H	350.0 L/H
Radiator Cooling Air Flow	1434 m^3/min	1434 m^3/min
Max Exhaust Gas Flow	285 m^3/min	283 m^3/min

The above performance data are valid as per the following specs:
- Diesel Fuel is according to BS2869 Class A2 or equivalent.
- Lubricating oil is according to API CG4 (15W/40).
- The coolant should be 50% antifreeze and 50% fresh water.

Alternator Technical Data		
Model	Leroy Somer LSA 50.1 VL10	
Regulation	± 0.5 %	
International protection	IP21	
Insulation class	H	
Terminals	6	
Frequency	50 Hz	60 Hz
Coolant Air Flow	1.6 m^3/s	1.6 m^3/s

Shipping Data			
Length	Width	Height	Weight
5200 mm	2200 mm	2300 mm	10300 kg

All information given in this leaflet is correct at the time of printing but it may be changed subsequently by the Company

ISO 9001 : 2000
Certificate Number: CC1680-009512,009912

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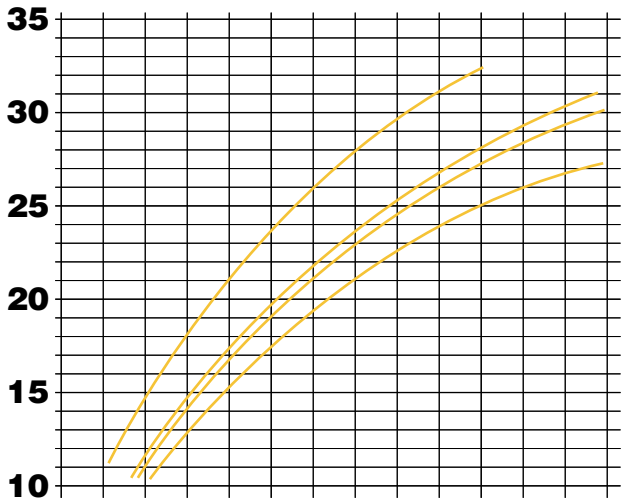
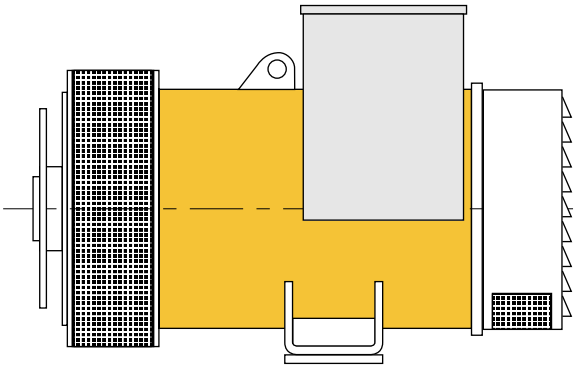




ALTERNATORS

LSA 50.1 - 4 Pole

Electrical and mechanical data

PARTNER®

ALTERNATORS

LSA 50.1 - 4P

50 Hz - 1500 r.p.m.

ELECTRICAL DATA

Insulation class	**H**	Excitation system	**A R E P + PMI**
Winding pitch - Code	**2/3 - (N° 6)**	A.V.R. model	**R 449**
Leads	**6**	Voltage regulation (steady state)	**± 0,5 %**
Drip proof	**IP 23**	Sustained short-circuit current	**300% (3 IN) : 10s**
Altitude	**≤ 1000 m**	Total harmonic (*) TGH / THC	**< 4 %**
Overspeed	**2250 min $^{-1}$**	Waveform : NEMA = TIF - (*)	**< 50**
Air flow	**1,6 m^3/s**	Waveform : I.E.C. = THF - (*)	**< 2 %**

(*) Total harmonic content line to line, at no load or full rated linear and balanced load

RATINGS : kVA / *kW* - Power factor = 0,8

Duty/Ambiant T°		Continuous / 40°C						Stand-by / 40°C			Stand-by / 27°C		
Class/T° rise		H / 125° K			F / 105° K			H / 150° K			H / 163° K		
Phase		**3 ph.**			**3 ph.**			**3 ph.**			**3 ph.**		
Y		380V	400V	415V	380V	400V	415V	380V	400V	415V	380V	400V	415V
Δ		220V	230V	240V	220V	230V	240V	220V	230V	240V	220V	230V	240V
50.1 S2	kVA	**910**			820			960			**1000**		
	kW	*728*			*656*			*768*			*800*		
50.1 S4	kVA	**1025**			925			1075			**1130**		
	kW	*820*			*740*			*860*			*904*		
50.1 M6	kVA	**1225**			1100			1290			**1350**		
	kW	*980*			*880*			*1032*			*1080*		
50.1 M7	kVA	**1325**			1190			1390			**1460**		
	kW	*1060*			*952*			*1112*			*1168*		
50.1 L8	kVA	**1425**			1280			1500			**1570**		
	kW	*1140*			*1024*			*1200*			*1256*		
50.1 VL10	kVA	**1580**			1420			1660			**1740**		
	kW	*1264*			*1136*			*1328*			*1392*		

EFFICIENCIES (%) - Class H / 40° C

	Three phase : 400 V									
	P.F. = 0,8					P.F. = 1				
	1/4	2/4	3/4	4/4	St.by	1/4	2/4	3/4	4/4	St.by
50.1 S2	92,6	94,6	94,6	94,1	93,8	93,2	95,6	96	96	95,9
50.1 S4	93	94,9	95	94,5	94,3	93,6	95,9	96,3	96,2	96,1
50.1 M6	93,6	95,3	95,4	94,9	94,7	94,2	96,2	96,6	96,5	96,5
50.1 M7	93,8	95,5	95,5	95,1	94,9	94,4	96,4	96,7	96,7	96,6
50.1 L8	94	95,7	95,8	95,5	95,3	94,5	96,5	96,9	96,9	96,8
50.1 VL10	94,2	95,9	96	95,7	95,5	94,7	96,6	97	97	96,9

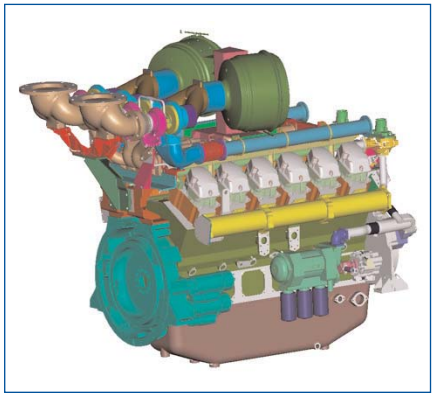
REACTANCES (%) - TIME CONSTANTS (ms) - CLASS H / 400 V

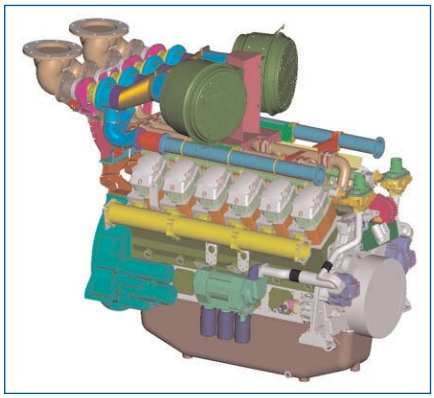
		50.1 S2	50.1 S4	50.1 M6	50.1 M7	50.1 L8	50.1 VL10
Kcc	Short-circuit ratio	0,331	0,343	0,352	0,349	0,371	0,382
Xd	Direct axis synchronous reactance unsaturated	395	381	377	375	353	342
Xq	Quadrature axis synchronous reactance unsaturated	237	229	226	225	212	205
T'do	Open circuit time constant	2210	2350	2520	2600	2720	2830
X'd	Direct axis transient reactance saturated	29,7	28,2	27,3	26,7	24,6	23,1
T'd	Short circuit transient time constant	196	205	214	218	222	225
X"d	Direct axis subtransient reactance saturated	16,4	15,5	15	14,8	13,5	12,7
T"d	Subtransient time constant	16	17	18	19	20	21
X"q	Quadrature axis subtransient reactance saturated	20,5	19,5	18,8	18,5	16,9	16
Xo	Zero sequence reactance unsaturated	3,9	3,7	3,5	3,5	3,2	3,0
X2	Negative sequence reactance saturated	18,5	17,5	16,9	16,5	15,2	14,3
Ta	Armature time constant	33	36	39	41	41	42

OTHER DATA - CLASS H / 400 V

io (A)	No load excitation current	1,05	1,05	1,1	1,1	1,3	1,3
ic (A)	Full load excitation current	5	4,85	4,9	4,9	5	5
uc (V)	Full load excitation voltage	63	61	62	62	63	63
ms	Recovery time (ΔU = 20 % transient)	< 500	< 500	< 500	< 500	< 500	< 500
kVA	Motor start. (ΔU = 20% sust.) or (ΔU = 50% Transient)	1820	2000	2500	2650	2850	3150
%	Transient dip (rated step load) - PF : 0,8 LAG	15	14	13,5	13	12,5	12
W	No load losses	12050	12722	13705	14199	15091	16100
W	Heat rejection	45645	47725	52665	54616	53717	56794

According to : I.E.C. 34.1/34.2 - U.T.E. : NF C 51.111 - V.D.E. 0530 - B.S. 4999 & 5000 - NEMA : MG 1.22 - ISO 8528 . 3 - CSA (C 22.2 + UL 2200).





The Perkins 4000 Series family of 6, 8, 12 and 16 cylinder diesel engines was designed in advance of today's uncompromising demands within the power generation industry and includes superior performance and reliability. 4012-46TAG2A ElectropaK is a newly developed turbocharged, air-to-air charge cooled, 12 cylinder diesel engine. Offered with either Temperate or Tropical cooling packages (with or without fuel oil cooling). Their premium design and specification features provide economic and durable operation as well as exceptional power to weight ratio, improved serviceability, low gaseous emissions, overall performance and reliability essential to the power generation market.

4000 Series

4012-46TAG2A

Diesel Engine – ElectropaK

1380 kWm 1500 rpm
1380 kWm 1800 rpm

Economic power

- Individual four valve per cylinder heads give optimised gas flows, whilst digitally governed unit fuel injectors ensure ultra-fine fuel atomisation and hence controlled rapid combustion, for efficiency and economy
- Commonality of components with other engines in the 4000 Series family allows reduced parts stocking levels

Reliable power

- Developed and tested using latest engineering techniques
- Piston temperature are controlled by an advanced gallery jet cooling system
- All engines are tolerant of a wide range of temperatures without derate
- Service is provided by the extensive Perkins network of over 4,000 distributors and dealers worldwide

Clean, efficient power

- Exceptional power to weight ratio and compact size for easier transportation and installation
- New designed radiator assemblies with corrosion inhibiting powder coated finish; fewer pipe joints and easier access to reduce maintenance times
- Designed to provide excellent service access for ease of maintenance
- Engines designed to comply with major international standards
- Low gaseous emissions that will satisfy the requirements of ½ TA Luft (1986)

Engine Speed (rev/min)	Type of Operation	Typical Generator Output (Net)		Engine Power			
				Gross		Net	
		kVA	kWe	kWm	bhp	kWm	bhp
1500	Baseload Power	1194	955	1055	1415	995	1334
4012-46TAG2A	Prime Power	1505	1204	1314	1762	1254	1682
	Standby (maximum)	1656	1325	1440	1931	1380	1851
1800	Baseload Power	1194	955	1055	1415	995	1334
4012-46TAG2A	Prime Power	1505	1204	1314	1762	1254	1682
	Standby (maximum)	1656	1325	1440	1931	1380	1851

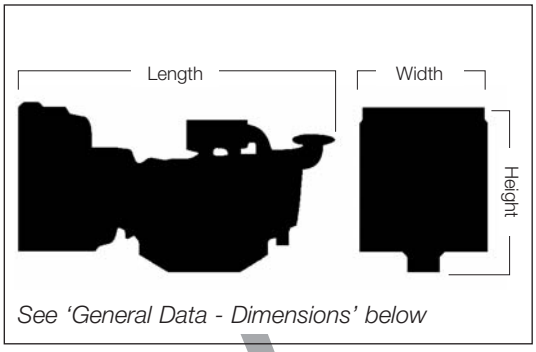
The above ratings represent the engine performance capabilities guaranteed within plus or minus 3% at the reference conditions equivalent to those specified in ISO 8528/1, ISO 3046/1, BS 5514/1.

Rating conditions: 25°C air inlet temperature, barometric pressure 100 kPa, relative humidity 30%. Please consult your distributor or the factory for ratings in other ambient conditions.
Note: For full ratings please refer to Perkins Engines Company Limited. All electrical ratings are based on an average alternator efficiency and a power factor of 0.8.
Fuel specification: BS2869: Class A2.

Rating Definitions
Baseload Power: Power available for continuous full load operation. No overload is permitted.
Prime Power: Power available for variable load with an average load factor not exceeding 80% of the prime power rating in any 24 hour period. Overload of 10% permitted for 1 hour in every 12 hours operation
Standby (maximum): Power available at variable load in the event of a main power network failure up to a maximum of 500 hours per year. No overload is permitted.

Publication No. 1826/01/06 Produced in England

4000 Series
4012-46TAG2A



See 'General Data - Dimensions' below

Standard ElectropaK Specification

Air inlet
- Mounted air filters and turbochargers

Fuel System
- Direct fuel injection system with fuel lift pump
- Governing to ISO 8528-5 class G2 with isochronous capability
- Full-flow spin-on fuel oil filters

Lubrication System
- Wet sump with filler and dipstick
- Full-flow spin-on oil filters
- Engine jacket water/lub oil temperature stabiliser

Cooling System
- Two twin thermostats
- System designed for ambients up to 50ºC
- Powder coated radiator comprising: water radiator; air charge cooled radiator; fuel oil cooling (optional); all pipes, hoses and clips; fan; pulleys; fan belts and safety guards

Electrical Equipment
- 24 volt starter motor and 24 volt alternator with integral regulator and DC output
- Overspeed switch and magnetic pickup
- Turbine inlet temperature shutdown switch
- Twin high coolant temperate shutdown switches
- Twin low oil pressure shutdown switches

Flywheel and Housing
- Flywheel to SAE J620 size 18
- SAE 00 flywheel housing

Optional Equipment
Choice of temperature or tropical radiators available dependant on operational cooling requirements
Fuel oil cooler integral to the radiator assembly
Immersion heater with thermostat
Note: This list is not exhaustive, further options will be available at the product's introduction

General Data

Number of cylinders		12	
Cylinder arrangement		60º Vee form	
Bore and stroke		160 x 190 mm	
Displacement		45.842 litres	
Induction system		Turbocharged and air to air charge cooled	
Cycle		4 stroke	
Combustion system		Direct injection	
Compression ratio		13.6:1	
Rotation		Anti-clockwise, viewed from flywheel end	
Cooling system		Water-cooled	
Firing order		1A, 6B, 5A, 2B, 3A, 4B, 6A, 1B, 2A, 5B, 4A, 3B	
Total lubrication system capacity		177.6 litres	
		Temperate	Tropical
Total coolant capacity		225 litres	240 litres
Total weight		5540 kg	5650 kg
Dimensions	Length	3924 mm	3924 mm
	Width	1798 mm	2192 mm
	Height	2287 mm	2267 mm

Final weight and dimensions will depend on completed specification

Fuel Consumption (g/kWh)		
Engine Speed	1500 rev/min 4012-46TAG2A	1800 rev/min 4012-46TAG2A
At Standby Maximum Rating	210	224
At Prime Power Rating	209	218
At Continuous Baseload Rating	210	210
At 75% of Prime Power Rating	211	213
At 50% of Prime Power Rating	213	206
At 25% of Prime Power Rating	230	221

Perkins®

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Distributed by

Attenuator-Attenuator

This type of enclosures is distinguished from all of our other types with its excellent capability of noise reduction, this is mainly because of the presense of attenuators on each of the air inlet and outlet sides.
It is fully weather proofed and the exhaust muffler is mounted on the top to ensure proper cooling and ventilation.

Charasteristics:

- Body and components made of steel painted with highly corrosive synthetic gloss.
- Large doors for maintenance (two or four depending on the size).
- Stainless steel locks and hinges.
- Easy access for the radiator and the control panel through the outlet and inlet attenuators.
- Lube oil pipe can be reached externally to allow easy drainage.
- Fuel fill and battery are secured through lockable doors.
- Lifting points on the top of the enclosure.
- Exhaust silencing system mounted externally.
- Emergency stop push button installed on the exterior of the enclosure (optional).

GHADDAR
MACHINERY Co. S.A.L.

YOUR POWER PARTNER

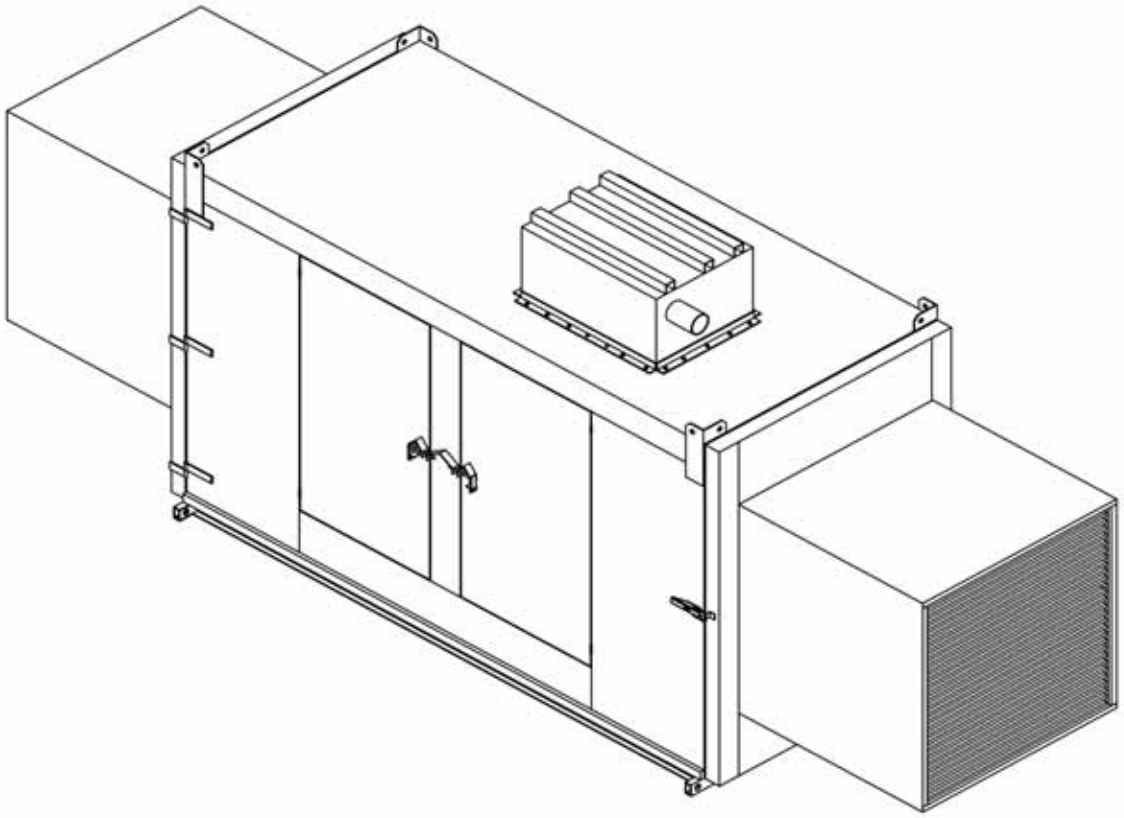
Range

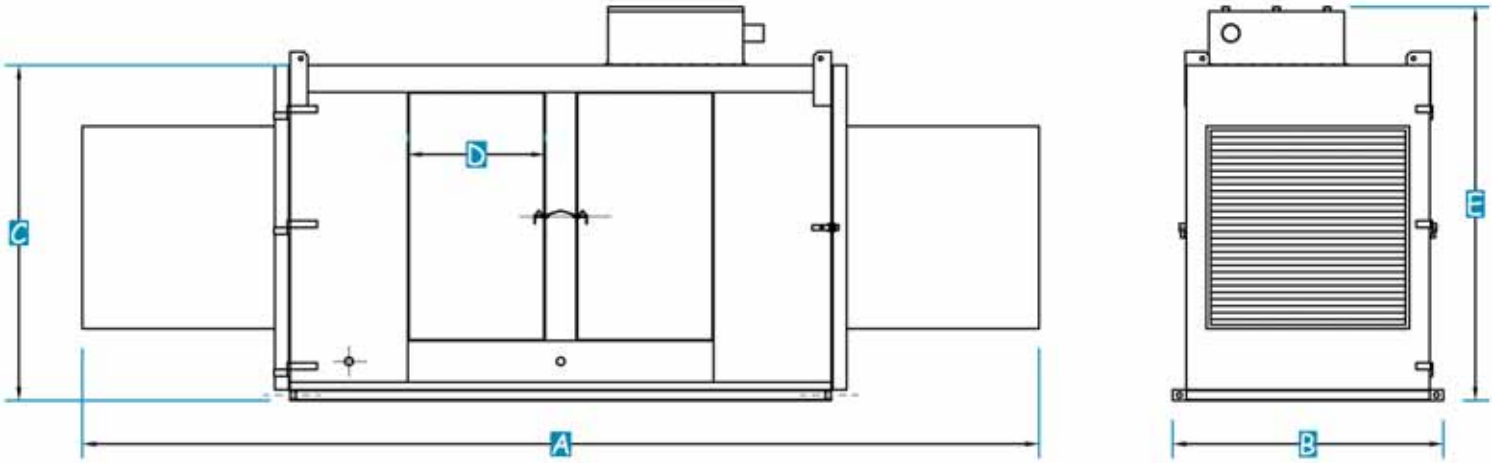
9 - 1500 KVA

ISO 9001 :2000
QMI REGISTERED
IQNet CERTIFIED MANAGEMENT SYSTEM
Certificate Numbers. CC1680-009512. 009912

Sound Pressure Levels (dBA)

		50 Hz						60 Hz					
		1 m		3 m		7 m		1 m		3 m		7 m	
Generating Set	Powertech	0%	100%	0%	100%	0%	100%	0%	100%	0%	100%	0%	100%
Engine model	KVA	Load	Load	Load	Load	Load	Load	Load	Load	Load	Load	Load	Load
403C-11G	9	66.5	67.8	63.5	64.8	58.5	59.8	68.2	69.5	65.2	66.5	60.2	61.5
403C-15G	13	66.5	67.8	63.5	64.8	58.5	59.8	68.2	69.5	65.2	66.5	60.2	61.5
404C-22G	20	66.5	67.8	63.5	64.8	58.5	59.8	68.2	69.5	65.2	66.5	60.2	61.5
1103A-33G	30	68.7	70.2	65.2	66.7	60.2	61.7	70.6	72.1	67.1	68.6	62.1	63.6
1103A-33TG1	45	67.3	68.8	63.8	65.3	58.8	60.3	69.2	70.7	65.7	67.2	60.7	62.2
1103A-33TG2	60	67.3	68.8	63.8	65.3	58.8	60.3	69.2	70.7	65.7	67.2	60.7	62.2
1104A-44TG1	65	67.3	68.8	63.8	65.3	58.8	60.3	69.2	70.7	65.7	67.2	60.7	62.2
1104A-44TG2	80	68.5	70	65	66.5	60	61.2	70.3	71.8	66.8	68.3	61.8	63
1006TG1A	95	70.3	71.8	66.8	68.3	61.8	63	72.8	74.3	69.3	70.8	64.3	65.5
1104C-44TAG2	100	70.3	71.8	66.8	68.3	61.8	63	72.8	74.3	69.3	70.8	64.3	65.5
1006TG2	105	70.3	71.8	66.8	68.3	61.8	63	72.8	74.3	69.3	70.8	64.3	65.5
1006TAG1	135	71.5	73	68	69.5	63	64.2	74	75.5	70.5	72	65.5	66.7
1006TAG2	150	71.5	73	68	69.5	63	64.2	74	75.5	70.5	72	65.5	66.7
1306C-E87TAG3	200	73.7	76.4	70.2	72.3	65.2	67.6	76.6	79.3	73.1	75.2	68.1	70.5
1306C-E87TAG6	250	73.7	76.4	70.2	72.3	65.2	67.6	76.6	79.3	73.1	75.2	68.1	70.5
2306C-E14TAG2	350	75.2	77.9	71.7	73.8	66.7	69.1	78.1	80.8	74.6	76.7	69.6	72
2306C-E14TAG3	400	75.2	77.9	71.7	73.8	66.7	69.1	78.1	80.8	74.6	76.7	69.6	72
2806C-E16TAG1	450	75.9	78.6	72.4	74.5	67.4	69.8	79	81.7	75.5	77.6	70.5	72.9
2806C-E16TAG2	500	75.9	78.6	72.4	74.5	67.4	69.8	79	81.7	75.5	77.6	70.5	72.9
2806C-E18TAG1	550	77.1	80	73.6	76.9	68.6	71.2	80.3	83.2	76.8	80.1	71.8	74.4
2806C-E18TAG2	625	77.1	80	73.6	76.9	68.6	71.2	80.3	83.2	76.8	80.1	71.8	74.4
4006C-23TAG2A	725	77.8	80.7	74.3	77.6	69.3	71.9	81.3	84.2	77.8	81.1	72.8	75.4
4006C-23TAG3A	800	78.1	81.6	74.6	78.5	69.6	72.8	81.5	85	78	81.9	73	76.2
4008TAG2	1000	78.1	81.6	74.6	78.5	69.6	72.8	81.5	85	78	81.9	73	76.2
4012TWG2	1250	78.9	82.4	75.4	79.3	70.4	73.6	82.9	86.4	79.4	83.3	74.4	77.6
4012TAG2	1500	80.5	84	77	80.9	72	75.2	85	88.5	81.5	85.3	76.5	79.7





Dimensions

Generating Set	Powertech	A: mm	B: mm	C: mm	D: mm	E: mm
Engine model	KVA					
403C-11G	9	2920	1100	1300	834	1650
403C-15G	13	2920	1100	1300	834	1650
404C-22G	20	2920	1100	1300	834	1650
1103A-33G	30	4580	1200	1700	980	2050
1103A-33TG1	45	4580	1200	1700	980	2050
1103A-33TG2	60	4580	1200	1700	980	2050
1104A-44TG1	65	4580	1200	1700	980	2050
1104A-44TG2	80	4580	1200	1700	980	2050
1006TG1A	95	5120	1360	1970	634	2320
1104C-44TAG2	100	5120	1360	1970	634	2320
1006TG2	105	5120	1360	1970	634	2320
1006TAG1	135	5120	1360	1970	634	2320
1006TAG2	150	5120	1360	1970	634	2320
1306C-E87TAG3	200	5570	1800	2410	784	2760
1306C-E87TAG6	250	5570	1800	2410	784	2760
2306C-E14TAG2	350	6370	2000	2410	1000	2760
2306C-E14TAG3	400	6370	2000	2410	1000	2760
2806C-E16TAG1	450	7070	2000	2580	1000	2930
2806C-E16TAG2	500	7070	2000	2580	1000	2930
2806C-E18TAG1	550	7070	2000	2580	1000	2930
2806C-E18TAG2	625	7070	2000	2580	1000	2930
4006C-23TAG2A	725	8620	2552	2850	986	3200
4006C-23TAG3A	800	8620	2552	2850	986	3200
4008TAG2	1000	8620	2552	2850	986	3200
4012TWG2	1250	9120	2552	3200	985	3550
4012TAG2	1500	10700	2750	3450	982	3800