



KAL224 Series

Fujian Kwise Generator Co., Ltd.

32kW - 80 kW

Application and Standard

The 4-pole generator is suitable for matching with a reciprocating internal combustion engine (commonly called a diesel engine) to form a generator set, which can be used as a fixed power supply or backup power supply for national defense, post and telecommunications, airports, hospitals, buildings, oil exploration, industrial and mining enterprises and other departments.

Alternators are in compliance with the main domestic and international standards and regulations: GB755, BS5000, IEC60034, VDE0530, CSAC22.2-100, NEMAMG-1.22. Alternators' manufacturing, design and mark are carried out in the environment of ISO9001.

Electrical features

Automatic voltage regulators: Kwise 4 Pole Alternators are fitted with reliable and performant AVR, adapted to excitation systems, powered by transistors and fulfilling perfect regulation.

Short circuit capacity: Kwise propose two choices of excitation systems to meet different customer requirements:

- A) Self-Excitation system, without short-circuit capacity.
- B) PMG, with a short-circuit capacity of 3 times of the nominal current for 10 seconds.

Transient features: Transient voltage dip for 60% rated current at 0.4 power factor is less than 15%. Recovery time for a 15% transient voltage dip is less than 1.5s.

Parallel operation: All 4 pole alternators can operate in parallel with other alternators or with the mains, when they are equipped with the appropriate devices (AVR, current transformer...).

Overload acceptance: 4 pole alternators can be overloaded according to NEMA.

Single-phase operation: 224 series 4 pole alternators can be connected for single phase use. 224 series alternators can be supplied with a dedicated single phase winding (D51/D61).

Waveform: Total harmonic distortion (THD), at no load or linear load is less than 5% according to IEC. Telephone influence factor (TIF) according to NEMA is less than 50.

Frequency: 4 pole alternators may operate either 50Hz or 60Hz. The standard winding (B31, B32) is suitable both for 50Hz and 60Hz.

Power factor: 4 pole alternators are designed to operate between 0.8 and 1.0 power factor. A derating is necessary below 0.8 power factor (see derating table).

Mechanical features

Forms: 4 pole alternators can be provided in single bearing or double bearing configurations according to customer's requirements, as well as Engine adaptors and coupling discs which are fit for the major engines.

Balancing: All the rotors are dynamically balanced according to ISO1940. Double bearing rotors are balanced with a half key.

Insulation and protection: 4 pole alternators are class H insulated. The standard winding protection can accept up to 95% relative humidity and is suitable in the cabins. Specific added coatings can be proposed for harsh environments.



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4 Poles

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Enclosure: Standard enclosure is IP23.

Direction of rotation: 224 series can operate in both directions.

Terminal box and connectors: 4 pole alternators have a terminal box which allows easy access for connection of AVR or reconnection. Current transformers or other optional modules can be fitted with in the box.

Bearings: Sealed for life bearings up to all Kwise 4 pole alternator.

Overs peed: The maximum overspeed is 2250rpm for the 4 pole alternator (1.25 times the 60Hz rated speed).

Mechanical structure: Steel frame. Cast iron or steel housing and flanges depending on models.

General parameters

Ambient temperature	40°C	Temperature rise	125K	Short circuit current multiple	/
Altitude	1000m	Voltage regulation	± 1%	Cooling method	IC01
Insulation class	Class H	Exciter system	Brushless self-excitation	Direction of rotation	Clockwise
Duty type	S1	Winding pitch	2/3	Maximum speed	2250rpm
Phases	3	Power factor	0.8	Protection grade	IP23
Number of poles	4	TIF	<50	Frequency	50/60Hz
AVR model	SX460	THF	<2%	THD	2.5%



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Electrical parameters

50Hz/1500RPM		Standard Winding / Power Factor 0.8							
Dutytype/Temperature rise/Ambient		Cont./125K/40°C				Standby/163K/27°C			
Phase		3-Phases				3-Phases			
Voltage	Y	380V	400V	415V	440V	380V	400V	415V	440V
	Δ	220V	230V	240V		220V	230V	240V	
	YY*				220V				220V
KAL224A1	kVA	40	40	40	38	45	45	45	42
	kW	32	32	32	30	36	36	36	33
KAL224B1	kVA	43	43	43	40	48	48	48	44
	kW	34	34	34	32	38	38	38	36
KAL224C1	kVA	50	50	50	48	56	56	56	52
	kW	40	40	40	38	45	45	45	42
KAL224D2	kVA	56	56	56	53	63	63	63	59
	kW	45	45	45	43	50	50	50	47
KAL224E2	kVA	63	63	63	59	70	70	70	65
	kW	50	50	50	48	56	56	56	52
KAL224F3	kVA	68	68	68	64	76	76	76	71
	kW	54	54	54	51	60	60	60	56
KAL224G3	kVA	73	73	73	69	81	81	81	76
	kW	58	58	58	55	65	65	65	61
KAL224H4	kVA	80	80	80	76	90	90	90	84
	kW	64	64	64	61	72	72	72	67
KAL224K4	kVA	85	85	85	81	95	95	95	89
	kW	68	68	68	65	76	76	76	71
KAL224L5	kVA	94	94	94	89	105	105	105	98
	kW	75	75	75	71	84	84	84	78
KAL224M5	kVA	100	100	100	95	112	112	112	105
	kW	80	80	80	76	90	90	90	84

* Only 12-wire alternator can be realized, other voltages please consult the factory.



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Electrical parameters

60Hz/1800RPM		Standard Winding / Power Factor 0.8							
Duty type/Temperature rise/Ambient		Cont./125K/40°C				Standby/163K/27°C			
Phase		3-Phases				3-Phases			
Voltage	Y	416V	440V	460V	480V	416V	440V	460V	480V
	Δ	240V				240V			
	YY*	208V	220V	230V	240V	208V	220V	230V	240V
KAL224A1	kVA	43	46	48	48	47	51	53	53
	kW	34	37	38	38	38	40	42	42
KAL224B1	kVA	46	49	51	51	50	54	56	56
	kW	37	39	41	41	40	43	45	45
KAL224C1	kVA	54	58	60	60	59	63	66	66
	kW	43	46	48	48	47	51	53	53
KAL224D2	kVA	60	65	68	68	67	71	74	74
	kW	48	52	54	54	53	57	59	59
KAL224E2	kVA	67	72	75	75	74	79	83	83
	kW	54	58	60	60	59	63	66	66
KAL224F3	kVA	73	78	81	81	80	85	89	89
	kW	58	62	65	65	64	68	71	71
KAL224G3	kVA	78	83	87	87	86	92	96	96
	kW	62	67	70	70	69	73	77	77
KAL224H4	kVA	86	92	96	96	95	101	106	106
	kW	69	74	77	77	76	81	84	84
KAL224K4	kVA	91	98	102	102	101	108	112	112
	kW	73	78	82	82	80	86	90	90
KAL224L5	kVA	101	108	113	113	111	119	124	124
	kW	81	86	90	90	89	95	99	99
KAL224M5	kVA	108	115	120	120	118	127	132	132
	kW	86	92	96	96	95	101	106	106

* Only 12-wire alternator can be realized, other voltages please consult the factory.

Moment of Inertia & Efficiency

Model	KAL224	A1	B1	C1	D2	E2	F3	G3	H4	K4	L5	M5
Inertia (1-Bearing) J	kgm^2	0.342	0.387	0.394	0.476	0.496	0.525	0.570	0.619	0.655	0.734	0.769
50Hz400V Efficiency (100% load)	%	88.3	88.8	89.3	89.5	90.0	90.0	91.2	91.4	91.4	91.5	91.5
60Hz440V Efficiency (100% load)	%	89.9	90.1	90.8	90.7	91.3	91.2	92.3	92.5	92.7	92.6	92.4

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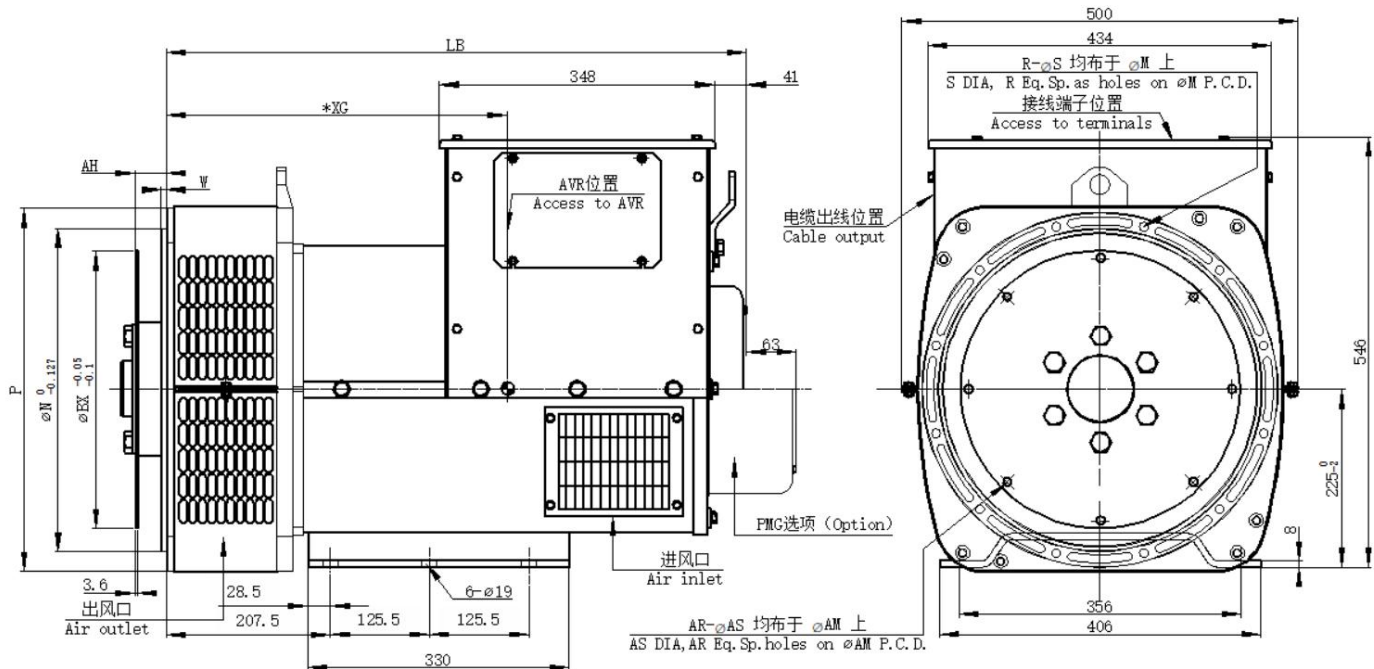
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Reactance (%) - Time Constant (ms)

50Hz @ 400V	KAL224	A1	B1	C1	D2	E2	F3	G3	H4	K4	L5	M5
Short circuit ratio	Kcc	0.33	0.35	0.35	0.34	0.36	0.36	0.35	0.35	0.37	0.37	0.36
Direct axis synchronous unsaturated reactance	Xd	301	289	290	292	279	280	282	285	271	270	274
Direct Axis Transient Saturation Reactance	X'd	20.4	19.3	18.7	18.5	17.3	17.2	17.1	17.1	16.1	15.9	16.0
Direct Axis Subtransient Saturation Reactance	X''d	12.2	11.6	11.2	11.1	10.4	10.3	10.3	10.3	9.7	9.5	9.6
Quadrature axis Synchronous Unsaturated Reactance	Xq	189	182	182	183	175	176	176	178	169	169	171
Quadrature Subtransient Saturation Reactance	X''q	17.2	16.4	16.2	16.2	15.2	15.2	15.1	15.1	14.2	14.0	14.1
Negative sequence saturation reactance	X2	10.47	10.04	10.02	10.09	9.59	9.64	9.68	9.77	9.28	9.23	9.37
Zero sequence unsaturated reactance	X0	1.15	1.04	0.94	0.88	0.78	0.75	0.71	0.68	0.62	0.58	0.57
Short-circuit transient time constant	T'd	80	73	66	62	54	52	49	46	42	38	37
Subtransient time constant	T''d	10	9	8	8	7	6	6	6	5	5	5
Open circuit time constant	T'do	3275	3040	2849	2703	2428	2342	2233	2145	1943	1807	1759
Armature time constant	Ta	13	15	19	22	26	28	32	36	41	45	49

60Hz @ 440V	KAL224	A1	B1	C1	D2	E2	F3	G3	H4	K4	L5	M5
Short circuit ratio	Kcc	0.28	0.35	0.29	0.29	0.30	0.30	0.30	0.29	0.31	0.31	0.31
Direct axis synchronous unsaturated reactance	Xd	358	282	345	351	332	334	336	339	322	323	326
Direct Axis Transient Saturation Reactance	X'd	24.3	18.8	22.3	22.2	20.6	20.5	20.4	20.4	19.2	19.0	19.1
Direct Axis Subtransient Saturation Reactance	X''d	14.6	11.3	13.4	13.3	12.4	12.3	12.2	12.2	11.5	11.4	11.5
Quadrature axis Synchronous Unsaturated Reactance	Xq	225	177	216	220	208	209	210	212	202	202	204
Quadrature Subtransient Saturation Reactance	X''q	20.5	15.9	19.3	19.4	18.1	18.0	18.0	18.0	16.9	16.7	16.8
Negative sequence saturation reactance	X2	12.46	9.79	11.92	12.10	11.42	11.47	11.52	11.63	11.04	11.03	11.15
Zero sequence unsaturated reactance	X0	1.37	1.02	1.12	1.05	0.92	0.89	0.84	0.81	0.74	0.70	0.68
Short-circuit transient time constant	T'd	79	59	66	61	54	51	48	46	41	38	37
Subtransient time constant	T''d	8	7	8	8	7	6	6	6	5	5	5
Open circuit time constant	T'do	3897	2963	3390	3240	2889	2787	2657	2553	2313	2160	2094
Armature time constant	Ta	13	13	18	22	25	28	31	36	40	45	49

Outline Drawing (Single Bearing)

Dimension(mm)

TYPE	LB		*Xg	Weight	Package
	SAE1	SAE2&3&4			
	mm	mm			
KAL224A1	606	591	264	202	710*560*730
KAL224B1	606	591	269	207	710*560*730
KAL224C1	606	591	279	216	710*560*730
KAL224D2	651	636	289	231	805*560*730
KAL224E2	651	636	299	241	805*560*730
KAL224F3	686	671	306	256	805*560*730
KAL224G3	686	671	316	265	805*560*730
KAL224H4	731	716	326	285	845*560*730
KAL224K4	731	716	336	304	845*560*730
KAL224L5	781	766	351	318	895*560*730
KAL224M5	781	766	361	330	895*560*730

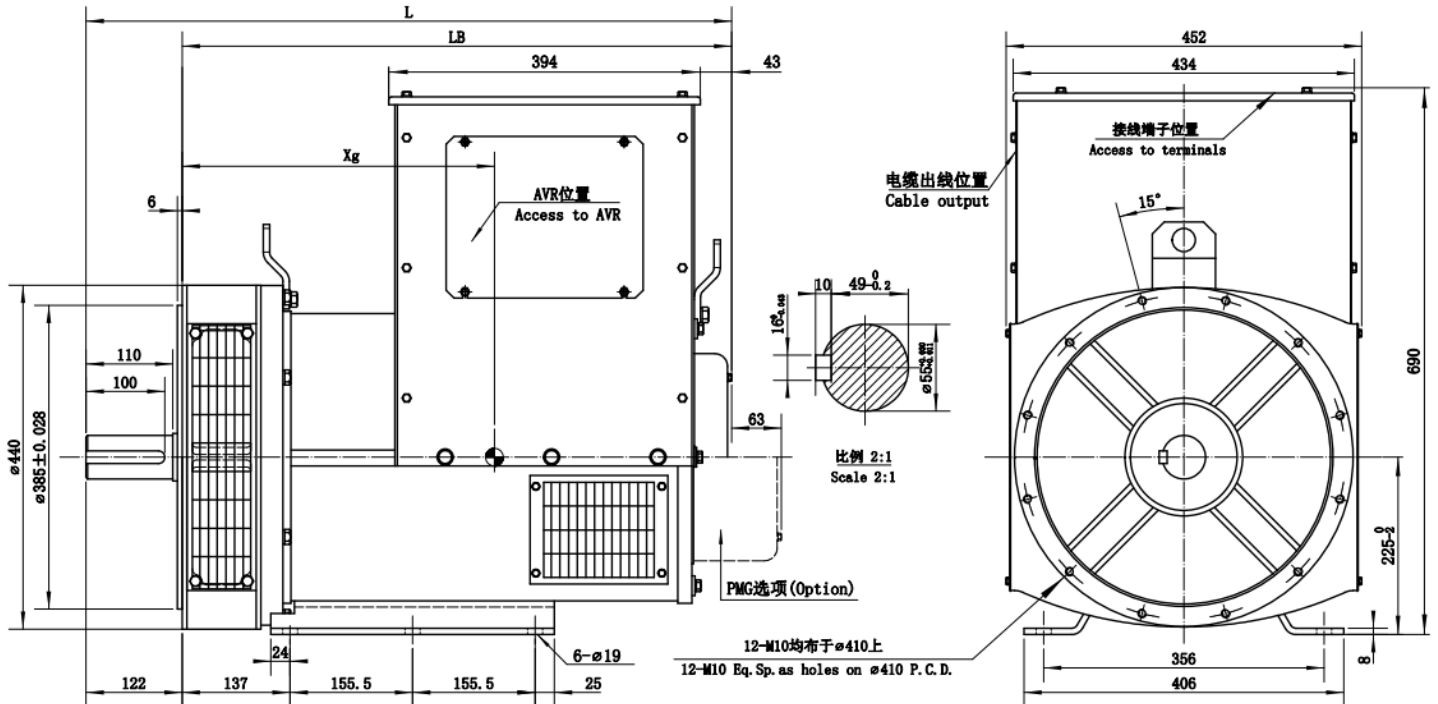
Flange (mm)

S.A.E	P	N	M	R- ϕ S	W	D	a°
#1	535	511.175	530.225	12- ϕ 12	6.5	217.7	15°
#2	490	447.675	466.725	12- ϕ 12	6.5	203.5	15°
#3	460	409.575	428.625	12- ϕ 12	6.5	203.5	15°
#4	460	361.95	381	12- ϕ 12	6.5	203.5	15°

Coupling Disc (mm)

S.A.E	BX	AM	AR- ϕ AS	AH
#7.5	241.3	222.25	8- ϕ 9	30.2
#8	263.525	244.475	6- ϕ 11	62
#10	314.325	295.3	8- ϕ 11	53.8
#11.5	352.425	333.38	8- ϕ 11	39.6
#14	466.725	438.15	8- ϕ 14	25.4

Outline Drawing (Double Bearing)



Dimension (mm)					
TYPE	L	LB	*Xg	Weight	Package
	mm	mm	mm	kg	L x W x H(mm)
KAL224A1	729	607	263	218	810*560*830
KAL224B1	729	607	263	225	810*560*830
KAL224C1	729	607	273	238	810*560*830
KAL224D2	729	607	273	249	905*560*830
KAL224E2	819	697	292	265	905*560*830
KAL224F3	819	697	292	275	905*560*830
KAL224G3	819	697	298	287	905*560*830
KAL224H4	864	742	306	300	945*560*830
KAL224K4	864	742	313	314	945*560*830
KAL224L5	864	742	323	334	995*560*830
KAL224M5					