DIY224 series

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 to the main domestic and international standards and regulations: GB755, BS5000, IEC60034, VDE 0530, CSA C22.2-100, NEMA MG-1.22. Alternators' manufacturing, design and mark are carried out in the environment of ISO9001.

Electrical features

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

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

A） Self-Excition 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: The 224 series 4-pole alternators can be connected to single-phase use when it is specified when ordering. 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.

4 poles

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 within the box.
Bearings: Sealed for life bearings up to all DIY 4 pole alternator.
Overspeed: The maximum overspeed is 2250 RPM 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.

4 poles

General parameters

Ambient temperature	40℃	Temperature rise	125K	Short circuit current multiple	/
Altitude	1000m	Voltage regulation	±1%	Cooling method	IC01
Insulation class	Class H	Exciter method	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	1.2%~2.5%

Electrical parameters

50Hz/1500RPM		**Standard winding/ Power Factor 0.8**							
Duty type/ Temperature rise/ Ambient temperature		Cont./125K/40℃				Standby/163K/27℃			
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
DIY224A1	kVA	40	**40**	40	38	45	45	45	42
	kW	32	**32**	32	30	36	36	36	33
DIY224B1	kVA	43	**43**	43	40	48	48	48	44
	kW	34	**34**	34	32	38	38	38	36
DIY224C1	kVA	50	**50**	50	48	56	56	56	52
	kW	40	**40**	40	38	45	45	45	42
DIY224D2	kVA	56	**56**	56	53	63	63	63	59
	kW	45	**45**	45	43	50	50	50	47
DIY224E2	kVA	63	**63**	63	59	70	70	70	65
	kW	50	**50**	50	48	56	56	56	52
DIY224F3	kVA	68	**68**	68	64	76	76	76	71
	kW	54	**54**	54	51	60	60	60	56
DIY224G3	kVA	73	**73**	73	69	81	81	81	76
	kW	58	**58**	58	55	65	65	65	61
DIY224H4	kVA	80	**80**	80	76	90	90	90	84
	kW	64	**64**	64	61	72	72	72	67
DIY224K4	kVA	85	**85**	85	81	95	95	95	89
	kW	68	**68**	68	65	76	76	76	71

4 poles

DIY224L5	kVA	94	**94**	94	89	105	105	105	98
	kW	75	**75**	75	71	84	84	84	78
DIY224M5	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.**

Electrical parameters

60Hz/1800RPM		**Standard winding/ Power Factor 0.8**							
Duty type/ Temperature rise/ Ambient temperature		Cont./125K/40℃				Standby/163K/27℃			
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
DIY224A1	kVA	43	**46**	50	50	47	51	55	55
	kW	34	**37**	40	40	38	40	44	44
DIY224B1	kVA	46	**49**	53	53	50	54	58	58
	kW	37	**39**	43	43	40	43	47	47
DIY224C1	kVA	54	**58**	63	63	59	63	69	69
	kW	43	**46**	50	50	47	51	55	55
DIY224D2	kVA	60	**65**	70	70	67	71	77	77
	kW	48	**52**	56	56	53	57	62	62
DIY224E2	kVA	67	**72**	78	78	74	79	86	86
	kW	54	**58**	63	63	59	63	69	69
DIY224F3	kVA	73	**78**	84	84	80	85	93	93
	kW	58	**62**	68	68	64	68	74	74
DIY224G3	kVA	78	**83**	91	91	86	92	100	100
	kW	62	**67**	73	73	69	73	80	80
DIY224H4	kVA	86	**92**	100	100	95	101	110	110
	kW	69	**74**	80	80	76	81	88	88
DIY224K4	kVA	91	**98**	106	106	101	108	117	117
	kW	73	**78**	85	85	80	86	94	94
DIY224L5	kVA	101	**108**	117	117	111	119	129	129
	kW	81	**86**	94	94	89	95	103	103
DIY224M5	kVA	108	**115**	125	125	118	127	138	138
	kW	86	**92**	100	100	95	101	110	110

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

4 poles

Moment of Inertia & Efficiency

Model	DIY224	A1	B1	C1	D2	E2	F3	G3	H4	K4	L5	M5
Moment of Inertia(single -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
50Hz 400V 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
60Hz 440V 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

Reactance (%) - Time Constant (ms)

50Hz @ 400V	DIY224	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

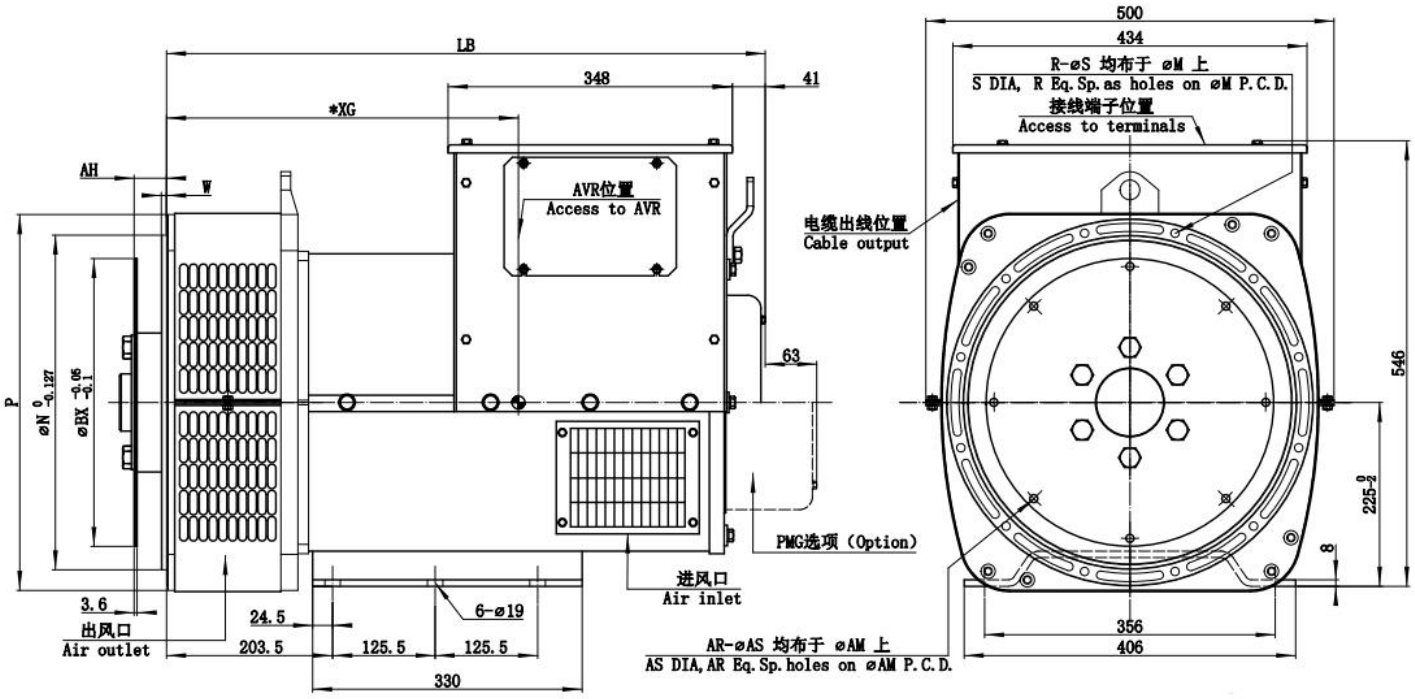
4 poles

Subtransient time constant	T”d	10	9	8	8	7	6	6	6	5	5	5
No-load 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	DIY224	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
No-load 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

4 poles

Outline Drawing (Single Bearing)



Dimension (mm)					
Model	LB		*Xg	Weight	Package
	SAE1	SAE2&3&4			
	mm	mm	mm	kg	L x W x H(mm)
DIY224A1	606	591	264	206	710*560*730
DIY224B1	606	591	269	213	710*560*730
DIY224C1	606	591	279	226	710*560*730
DIY224D2	651	636	289	237	805*560*730
DIY224E2	651	636	299	253	805*560*730
DIY224F3	686	671	306	263	805*560*730
DIY224G3	686	671	316	275	805*560*730
DIY224H4	731	716	326	288	845*560*730
DIY224K4	731	716	336	302	845*560*730
DIY224L5	781	766	351	322	895*560*730
DIY224M5	781	766	361	341	895*560*730

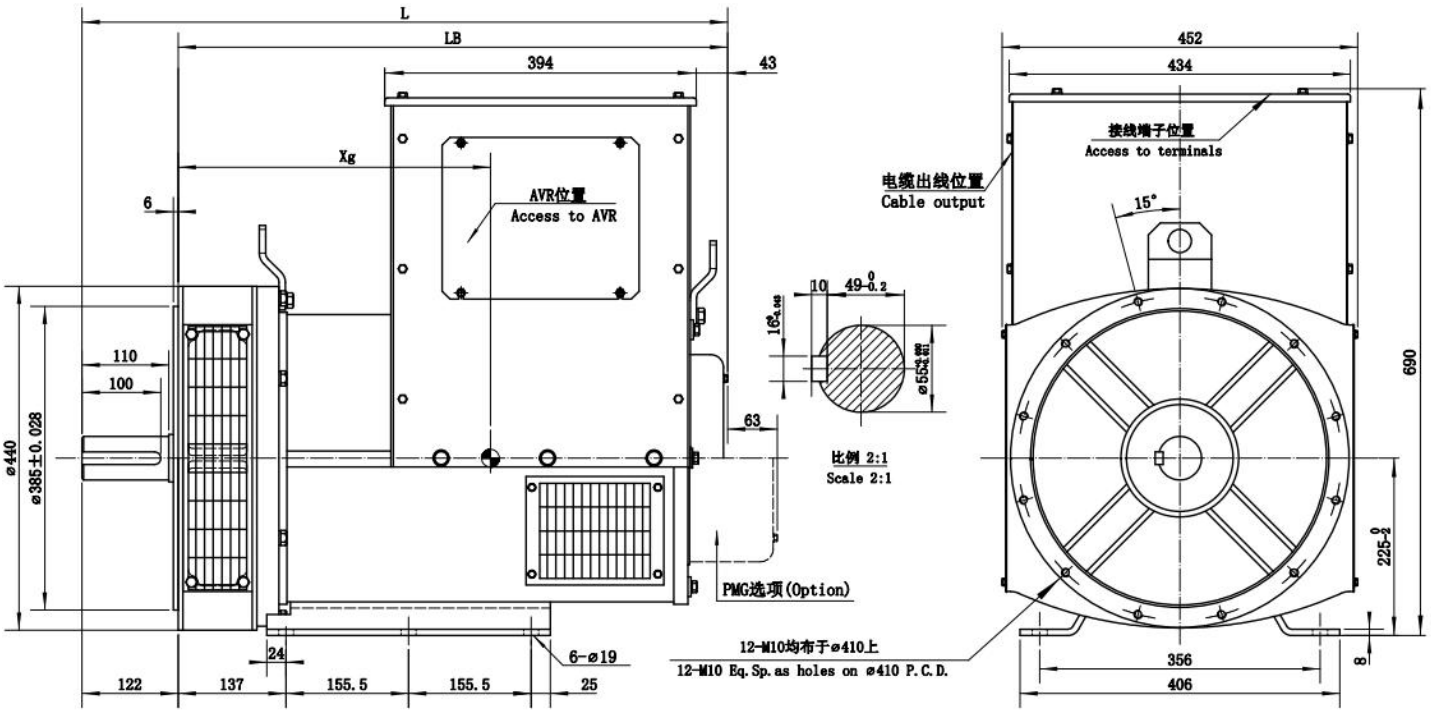
Front cover (mm)							
S.A.E	P	N	M	R-øS	W	D	a°
#1	535	511.175	530.225	12-ø12	6.5	217.7	15°
#2	490	447.675	466.725	12-ø12	6.5	203.5	15°
#3	460	409.575	428.625	12-ø12	6.5	203.5	15°

Coupling (mm)				
S.A.E	BX	AM	AR-øAS	AH
#7.5	241.3	222.25	8-ø9	30.2
#8	263.525	244.475	6-ø11	62
#10	314.325	295.3	8-ø11	53.8

4 poles

#4	460	361.95	381	12-ø12	6.5	203.5	15°		#11.5	352.425	333.38	8-ø11	39.6
									#14	466.725	438.15	8-ø14	25.4

Outline Drawing (Double Bearing)



Dimension(mm)					
Model	L	LB	*Xg	Weight	Package
	mm	mm	mm	kg	L x W x H(mm)
DIY224A1	729	607	263	218	810*560*830
DIY224B1	729	607	263	225	810*560*830
DIY224C1	729	607	273	238	810*560*830
DIY224D2	729	607	273	249	905*560*830
DIY224E2	819	697	292	265	905*560*830
DIY224F3	819	697	292	275	905*560*830
DIY224G3	819	697	298	287	905*560*830
DIY224H4	864	742	306	300	945*560*830
DIY224K4	864	742	313	314	945*560*830
DIY224L5	864	742	323	334	995*560*830
DIY224M5				367	995*560*830