ENETRA
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BRUSHLESS ASYNCHRONOUS ALTERNATORS

ETA224 SERIES

(50/60Hz, 4 Pole, 40.0KVA up to 100.0KVA with AVR)

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Application & 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 various applications.

Alternators are in compliance to 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

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.

Overload Acceptance
4 pole alternators can be overloaded according to NEMA.

Frequency
The standard winding (B31) is suitable both for 50Hz and 60Hz.

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...).

Single-phase Operation
224 series 4 pole alternators can be connected for single phase use.

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

Electrical Data

Insulation class	H
Wires	3Phase - 6 wires
Excitation system	Brushless
Voltage regulator type	AVR SX460
Voltage regulation accuracy	+/- 1%

Short circuit distortion	300%
Total harmonic distortion	<5% (at no or linear load)
Telephone harmonic factor	<2%
Winding pitch	2/3
Power factor (cose)	0.8 / 1.0

Mechanical Features

Bearings
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. Sealed for life bearings.

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

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

Insulation & Protection
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.

Direction of Rotation
Clockwise, but can operate in both directions.

Terminal Box & 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.

Enclosure
Standard enclosure is IP23.

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Ratings & Efficiencies

Excitation	Ratings								Efficiency	Inertia
	Cont. 125K/40°C				St. By 163K/27°C				50Hz, 400V at 100% Load	1-Bearing - J
50Hz / 1500rpm	3 Phase				3 Phase					
Voltage (Y)	380	**400**	415	440	380	400	415	440		
Voltage (▲)	220	**230**	240		220	230	240			
Voltage (YY)				220				220		
Type	KVA / kW				KVA / kW				%	Kgm²
ETA224A1	40.0	**40.0**	40.0	38.0	45.0	45.0	45.0	42.0	88.3	0.342
	32.0	32.0	32.0	30.0	36.0	36.0	36.0	33.0		
ETA224B1	43.0	**43.0**	43.0	40.0	48.0	48.0	48.0	44.0	88.8	0.387
	34.0	34.0	34.0	32.0	38.0	38.0	38.0	36.0		
ETA224C1	50.0	**50.0**	50.0	48.0	56.0	56.0	56.0	52.0	89.3	0.394
	40.0	40.0	40.0	38.0	45.0	45.0	45.0	42.0		
ETA224D2	56.0	**56.0**	56.0	53.0	63.0	63.0	63.0	59.0	89.5	0.476
	45.0	45.0	45.0	43.0	50.0	50.0	50.0	47.0		
ETA224E2	63.0	**63.0**	63.0	59.0	70.0	70.0	70.0	65.0	90.0	0.496
	50.0	50.0	50.0	48.0	56.0	56.0	56.0	52.0		
ETA224F3	68.0	**68.0**	68.0	64.0	76.0	76.0	76.0	71.0	90.0	0.525
	54.0	54.0	54.0	51.0	60.0	60.0	60.0	56.0		
ETA224G3	73.0	**73.0**	73.0	69.0	81.0	81.0	81.0	76.0	91.2	0.570
	58.0	58.0	58.0	55.0	65.0	65.0	65.0	61.0		
ETA224H4	80.0	**80.0**	80.0	76.0	90.0	90.0	90.0	84.0	91.4	0.619
	64.0	64.0	64.0	61.0	72.0	72.0	72.0	67.0		
ETA224K4	85.0	**85.0**	85.0	81.0	95.0	95.0	95.0	89.0	91.4	0.655
	68.0	68.0	68.0	65.0	76.0	76.0	76.0	71.0		
ETA224L5	94.0	**94.0**	94.0	89.0	105.0	105.0	105.0	98.0	91.5	0.734
	75.0	75.0	75.0	71.0	84.0	84.0	84.0	78.0		
ETA224M5	100.0	**100.0**	100.0	95.0	112.0	112.0	112.0	105.0	91.5	0.769
	80.0	80.0	80.0	76.0	90.0	90.0	90.0	84.0		
60Hz / 1800rpm	3 Phase				3 Phase					
Voltage (Y)	416	**440**	460	480	416	440	460	480	60Hz, 440V at 100% Load	1-Bearing - J
Voltage (▲)	240									
Voltage (YY)	208	**220**	230	240	208	220	230	240		
Type	KVA / kW				KVA / kW				%	Kgm²
ETA224A1	43.0	**46.0**	48.0	48.0	47.0	51.0	53.0	53.0	89.9	0.342
	34.0	37.0	38.0	38.0	38.0	40.0	42.0	42.0		
ETA224B1	46.0	**49.0**	51.0	51.0	50.0	54.0	56.0	56.0	90.1	0.387
	37.0	39.0	41.0	41.0	40.0	43.0	45.0	45.0		
ETA224C1	54.0	**58.0**	60.0	60.0	59.0	63.0	66.0	66.0	90.8	0.394
	43.0	46.0	48.0	48.0	47.0	51.0	53.0	53.0		
ETA224D2	60.0	**65.0**	68.0	68.0	67.0	71.0	74.0	74.0	90.7	0.476
	48.0	52.0	54.0	54.0	53.0	57.0	59.0	59.0		
ETA224E2	67.0	**72.0**	75.0	75.0	74.0	79.0	83.0	83.0	91.3	0.496
	54.0	58.0	60.0	60.0	59.0	63.0	66.0	66.0		
ETA224F3	73.0	**78.0**	81.0	81.0	80.0	85.0	89.0	89.0	91.2	0.525
	58.0	62.0	65.0	65.0	64.0	68.0	71.0	71.0		
ETA224G3	78.0	**83.0**	87.0	87.0	86.0	92.0	96.0	96.0	92.3	0.570
	62.0	67.0	70.0	70.0	69.0	73.0	77.0	77.0		
ETA224H4	86.0	**92.0**	96.0	96.0	95.0	101.0	106.0	106.0	92.5	0.619
	69.0	74.0	77.0	77.0	76.0	81.0	84.0	84.0		
ETA224K4	91.0	**98.0**	102.0	102.0	101.0	108.0	112.0	112.0	92.7	0.655
	73.0	78.0	82.0	82.0	80.0	86.0	90.0	90.0		
ETA224L5	101.0	**108.0**	113.0	113.0	111.0	119.0	124.0	124.0	92.6	0.734
	81.0	86.0	90.0	90.0	89.0	95.0	99.0	99.0		
ETA224M5	108.0	**115.0**	120.0	120.0	118.0	127.0	132.0	132.0	92.4	0.769
	86.0	92.0	96.0	96.0	95.0	101.0	106.0	106.0		

1. Enetra reserve the right to change the specifications of their products without notice as ongoing process of development.
2. Consult Enetra for further information.
3. Only 12 wire alternator can be realized, for other voltages please consult Enetra.
4. **General Parameters:** Cooling method: IC01 | THD=2.5% | TIF<50 | Altitude: 1,000m | Temperature Rise: 125K | Ambient Temperature: 40°C

CE ISO9001

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Reactance & Time Constant

Type	Rating (50Hz) Cont./125K/ 40°C/0.8/400V	Reactance								Time Constant			
		Kcc	Xd	X'd	X"d	Xq	X"q	X2	X0	T'd	T"d	T'do	Ta
	KVA	%	%	%	%	%	%	%	%	ms	ms	ms	ms
ETA224A1	40.0	0.33	301.0	20.4	12.2	189.0	17.2	10.47	1.15	80.0	10.0	3275.0	13.0
ETA224B1	43.0	0.35	289.0	19.3	11.6	182.0	16.4	10.04	1.04	73.0	9.0	3040.0	15.0
ETA224C1	50.0	0.35	290.0	18.7	11.2	182.0	16.2	10.02	0.94	66.0	8.0	2849.0	19.0
ETA224D2	56.0	0.34	292.0	18.5	11.1	183.0	16.2	10.09	0.88	62.0	8.0	2703.0	22.0
ETA224E2	63.0	0.36	279.0	17.3	10.4	175.0	15.2	9.59	0.78	54.0	7.0	2428.0	26.0
ETA224F3	68.0	0.36	280.0	17.2	10.3	176.0	15.2	9.64	0.75	52.0	6.0	2342.0	28.0
ETA224G4	73.0	0.35	282.0	17.1	10.3	176.0	15.1	9.68	0.71	49.0	6.0	2233.0	32.0
ETA224H4	80.0	0.35	285.0	17.1	10.3	178.0	15.1	9.77	0.68	46.0	6.0	2145.0	36.0
ETA224K4	85.0	0.37	271.0	16.1	9.7	169.0	14.2	9.28	0.62	42.0	5.0	1943.0	41.0
ETA224L5	94.0	0.37	270.0	15.9	9.5	169.0	14.0	9.23	0.58	38.0	5.0	1807.0	45.0
ETA224M5	100.0	0.36	274.0	16.0	9.6	171.0	14.1	9.37	0.57	37.0	5.0	1759.0	49.0

Type	Rating (60Hz) Cont./125K/ 40°C/0.8/440V	Reactance								Time Constant			
		Kcc	Xd	X'd	X"d	Xq	X"q	X2	X0	T'd	T"d	T'do	Ta
	KVA	%	%	%	%	%	%	%	%	ms	ms	ms	ms
ETA224A1	43.0	0.28	358.0	24.3	14.6	225.0	20.5	12.46	1.37	79.0	8.0	3897.0	13.0
ETA224B1	46.0	0.35	282.0	18.8	11.3	177.0	15.9	9.79	1.02	59.0	7.0	2963.0	13.0
ETA224C1	54.0	0.29	345.0	22.3	13.4	216.0	19.3	11.92	1.12	66.0	8.0	3390.0	18.0
ETA224D2	60.0	0.29	351.0	22.2	13.3	220.0	19.4	12.10	1.05	61.0	8.0	3240.0	22.0
ETA224E2	67.0	0.30	332.0	20.6	12.4	208.0	18.1	11.42	0.92	54.0	7.0	2889.0	25.0
ETA224F3	73.0	0.30	334.0	20.5	12.3	209.0	18.0	11.47	0.89	51.0	6.0	2787.0	28.0
ETA224G3	78.0	0.30	336.0	20.4	12.2	210.0	18.0	11.52	0.84	48.0	6.0	2657.0	31.0
ETA224H4	86.0	0.29	339.0	20.4	12.2	212.0	18.0	11.63	0.81	46.0	6.0	2553.0	36.0
ETA224K4	91.0	0.31	322.0	19.2	11.5	202.0	16.9	11.04	0.74	41.0	5.0	2313.0	40.0
ETA224L5	101.0	0.31	323.0	19.0	11.4	202.0	16.7	11.03	0.70	38.0	5.0	2160.0	45.0
ETA224M5	108.0	0.31	326.0	19.1	11.5	204.0	16.8	11.15	0.68	37.0	5.0	2094.0	49.0

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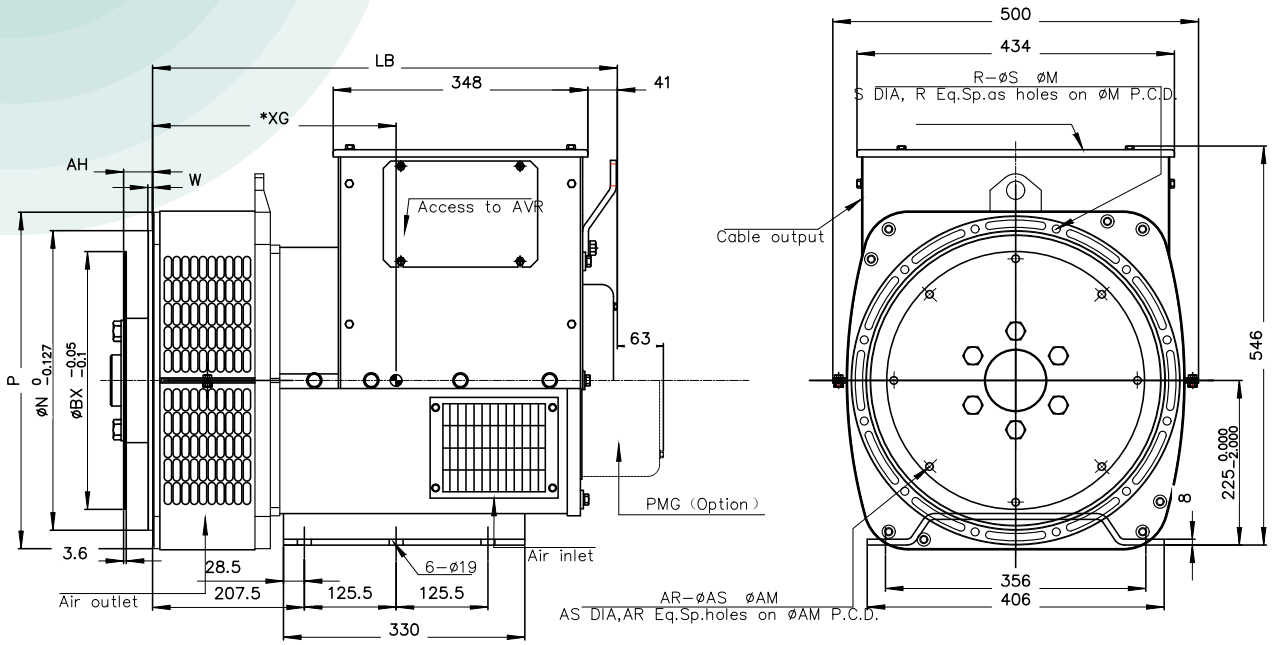
Dimensions & Weights



Dimensions & Weights							
	LB		Xg	Weight	Package		
	SAE1	SAE2&3&4	mm	Kg	Length (mm)	Width (mm)	Height (mm)
ETA224A1	606.0	591.0	264.0	202.0	710.0	560.0	730.0
ETA224B1	606.0	591.0	269.0	207.0	710.0	560.0	730.0
ETA224C1	606.0	591.0	279.0	216.0	710.0	560.0	730.0
ETA224D2	651.0	636.0	289.0	231.0	805.0	560.0	730.0
ETA224E2	651.0	636.0	299.0	241.0	805.0	560.0	730.0
ETA224F3	686.0	671.0	306.0	256.0	805.0	560.0	730.0
ETA224G3	686.0	671.0	316.0	265.0	805.0	560.0	730.0
ETA224H4	731.0	716.0	326.0	285.0	845.0	560.0	730.0
ETA224K4	731.0	716.0	336.0	304.0	845.0	560.0	730.0
ETA224L5	781.0	766.0	351.0	318.0	895.0	560.0	730.0
ETA225M5	781.0	766.0	361.0	330.0	895.0	560.0	730.0

Flange (mm)							
SAE #	P	N	M	R-øS	W	D	a°
1	535.0	511.175	530.225	12-ø12	6.5	217.7	15.0°
2	490.0	447.675	466.725	12-ø12	6.5	203.5	15.0°
3	460.0	409.575	428.625	12-ø12	6.5	203.5	15.0°
4	460.0	361.950	381.000	12-ø12	6.5	203.5	15.0°

Coupling Disc (mm)				
SAE #	BX	AM	AR-øAS	AH
7.5	241.300	222.250	8-ø9	30.2
8	263.525	244.475	6-ø11	62.0
10	314.325	295.300	8-ø11	53.8
11.5	352.425	333.380	8-ø11	39.6
14	466.725	438.150	8-ø14	25.4