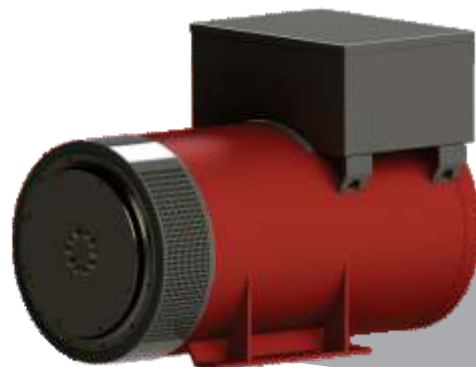


Application and Standard

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. Potenza Alternators are in compliance to the main domestic and international standards and regulations.



Electrical features

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

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

- A) Self-Excitation system, without short-circuit capacity.
- B) Other excitation systems, negotiable.

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: F2-50 series 4 pole alternators can be connected for single phase use. The single phase rating is given in the various alternator data sheets. F2-50 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.

Enclosure: Standard enclosure is IP23.

Direction of rotation: F2-50 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 Potenza 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. Aluminium, 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 method	Brushless self-excitation	Direction of rotation	Clockwise
Duty type	S1	Winding pitch	2/3	Maximum speed	2250 rpm
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								Special winding	
Duty type / temp rise / ambient temp		Cont. / 125K / 40°C				Standby / 163K / 27°C				Cont. / 125K / 40°C	
Phase		3 Phases				3 Phases				Single-phase	
Voltage	Y	380V	400V	415V	440V	380V	400V	415V	440V	220V / 230V / 240V	
	Δ	220V	230V	240V		220V	230V	240V		Power factor	
	YY				220V				220V	0.8	1.0
PO22	KVA	20	20	20	19	22	22	22	21	13.6	16
	KW	16	16	16	15.2	18	18	18	17	10.9	16
PO25	KVA	22.5	22.5	22.5	21.4	25	25	25	24	15.3	18
	KW	18	18	18	17	20	20	20	19	12	18
PO28	KVA	25	25	25	23.8	28	28	28	26	17	20
	KW	20	20	20	19	22	22	22	21	13.6	20
PO31	KVA	27.5	27.5	27.5	26	31	31	31	29	18.7	22
	KW	22	22	22	21	25	25	25	23	15	22
PO35	KVA	31	31	31	30	35	35	35	33	21.3	25
	KW	25	25	25	24	28	28	28	26	17	25
PO40	KVA	37.5	37.5	37.5	35.6	42	42	42	39	25.5	30
	KW	30	30	30	28.5	34	34	34	31	20.4	30
PO45	KVA	42.5	42.5	42.5	40	48	48	48	44	29	34
	KW	34	34	34	32	38	38	38	36	23	34

* Consult factory for other voltages

Electrical Parameters

60Hz/1800RPM		Standard winding / Power factor 0.8								Special winding	
Duty type / temp rise / ambient temp		Cont. / 125K / 40°C				Standby / 163K / 27°C				Cont. / 125K / 40°C	
Phase		3 Phases				3 Phases				Single-phase	
Voltage	Y	416V	440V	460V	480V	416V	440V	460V	480V	220V / 230V / 240V	
	Δ	240V				240V				Power factor	
	YY	208V	220V	230V	240V	208V	220V	230V	240V	0.8	1.0
PO22	KVA	21.5	23.0	25.0	25.0	24	25.3	27.5	27.5	15.3	18
	KW	17.2	18.4	20.0	20.0	19	20.2	22.0	22.0	12.2	18
PO25	KVA	24.2	25.9	28.1	28.1	27	28.5	30.9	30.9	17.2	20
	KW	19.4	20.7	22.5	22.5	21	22.8	24.8	24.8	13.8	20
PO28	KVA	26.9	28.8	31.3	31.3	30	31.6	34.4	34.4	19	23
	KW	21.5	23.0	25.0	25.0	24	25.3	27.5	27.5	15	23
PO31	KVA	29.6	31.6	34.4	34.4	33	34.8	37.8	37.8	21	25
	KW	23.7	25.3	27.5	27.5	26	27.8	30.3	30.3	17	25
PO35	KVA	33.6	35.9	39.1	39.1	37	40	43	43	24	28
	KW	27	28.8	31.3	31.3	30	32	34	34	19	28
PO40	KVA	40.3	43.1	46.9	46.9	44	47	52	52	28.7	34
	KW	32.3	34.5	37.5	37.5	35	38	41	41	23	34
PO45	KVA	45.7	48.9	53.1	53.1	50	54	58	58	33	38
	KW	36.6	39.1	42.5	42.5	40	43	47	47	26	38

Moment of Inertia & Efficiency

Model	F2-50	PO22	PO25	PO28	PO31	PO35	PO40	PO45
Moment of Inertia (single-bearing).J	kgm^2	0.137	0.155	0.165	0.184	0.211	0.256	0.280
50Hz 400V Efficiency (100% Load)	%	83.7	84.2	85.2	85.8	86.2	87.1	88.0
60Hz 440V Efficiency (100% Load)	%	84.7	85.2	85.9	86.7	86.9	87.7	88.4

* Consult factory for other voltages

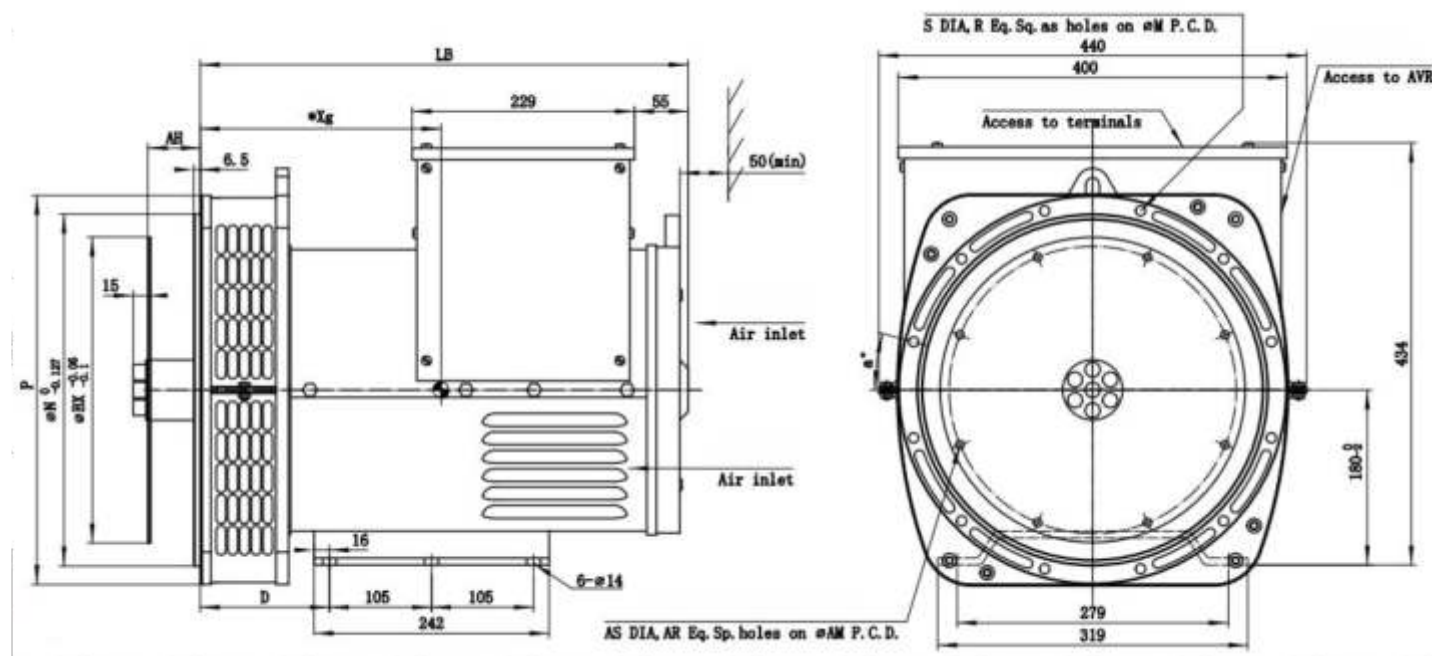
Reactance (%) - Time Constant (ms)

F2-50	50Hz @ 400V	PO22	PO25	PO28	PO31	PO35	PO40	PO45
Kcc	Short circuit ratio	0.45	0.45	0.42	0.46	0.44	0.42	0.45
Xd	Direct axis synchronous unsaturated reactance	221	221	239	217	229	239	221
X'd	Direct Axis Transient Saturation Reactance	17.2	17.0	18.1	16.3	16.9	17.4	15.9
X''d	Direct Axis Subtransient Saturation Reactance	10.5	10.2	10.7	9.6	9.8	9.9	9.0
Xq	Quadrature axis synchronous unsaturated reactance	126	126	136	124	130	135	125
X''q	Quadrature Subtransient Saturation Reactance	11.1	10.8	11.4	10.1	10.3	10.5	9.5
X2	Negative sequence saturation reactance	1.08	1.05	1.11	0.99	1.01	1.02	0.92
X0	Zero sequence unsaturated reactance	0.71	0.66	0.68	0.58	0.57	0.54	0.46
T'd	Short-circuit transient time constant	10	10	10	10	8	7	6
T''d	Subtransient time constant	13.0	12.0	12.2	12.0	10.4	9.1	7.5
T'do	Open circuit time constant	555	523	536	523	461	419	348
Ta	Armature time constant	13.2	15.2	18.2	15.2	20.0	31.0	35.8

Reactance (%) - Time Constant (ms)

F2-50	60Hz @ 440V	PO22	PO25	PO28	PO31	PO35	PO40	PO45
Kcc	Short circuit ratio	0.38	0.38	0.35	0.39	0.37	0.35	0.38
Xd	Direct axis synchronous unsaturated reactance	263	263	285	259	272	284	263
X'd	Direct Axis Transient Saturation Reactance	20.5	20.2	21.6	19.4	20.1	20.7	18.9
X''d	Direct Axis Subtransient Saturation Reactance	12.5	12.1	12.8	11.4	11.7	11.8	10.7
Xq	Quadrature axis synchronous unsaturated reactance	150	150	16	147	155	16	149
X''q	Quadrature Subtransient Saturation Reactance	13.3	12.9	12.8	12.1	12.3	12.5	11.3
X2	Negative sequence saturation reactance	1.29	1.25	1.32	1.17	1.20	1.21	1.10
X0	Zero sequence unsaturated reactance	0.09	0.79	0.08	0.69	0.67	0.64	0.55
T'd	Short-circuit transient time constant	10	10	10	8	8	7	6
T''d	Subtransient time constant	12.9	11.9	12.1	10.3	9.8	9.1	7.4
T'do	Open circuit time constant	661	622	337	549	531	498	414
Ta	Armature time constant	13.2	15.2	17.2	19.9	22.8	29.0	33.8

Outline Drawing (Single Bearing)



DIMENSION (MM)

Model	LB SAE2	LB SAE3	LB SAE 4&5	*Xg	Weight	Package
	mm	mm	mm	mm	kg	L x W x H (mm)
PO22	478	451	438.5	177	106	677*504*620
PO25	478	451	438.5	185	116	677*504*620
PO28	508	481	468.5	192	119	677*504*620
PO31	508	481	468.5	200	125	677*504*620
PO35	533	506	493.5	212	135	677*504*620
PO40	573	546	533.5	230	160	747*504*620
PO45	613	586	573.5	250	176	747*504*620

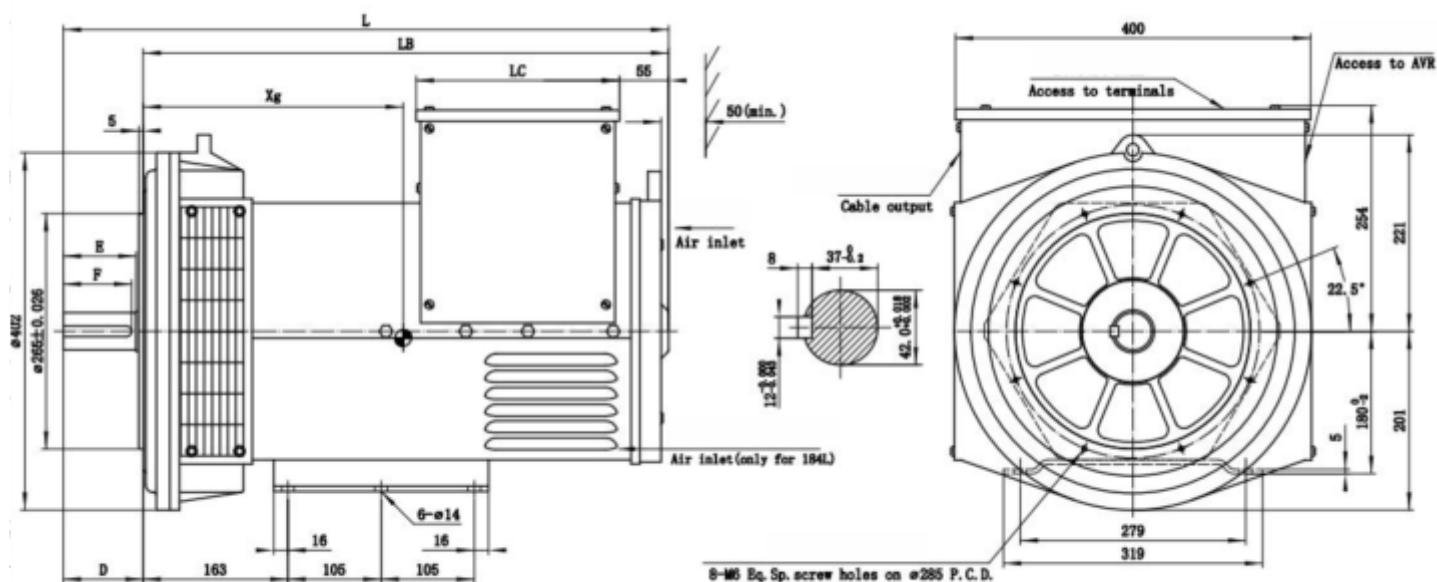
FRONT COVER (MM)

S.A.E	P	N	M	R-øS	W	D	a°
#2	490	447.675	466.725	12 - ø11	6	172	15°
#3	440	409.575	428.625	8 - ø11	6	145	15°
#4	400	361.95	381	8 - ø11	5	133	15°
#5	400	314.325	333.375	8 - ø11	5	133	22.5°

COUPLING (MM)

S.A.E	BX	AM	AR-øAS	AH
#6.5	215.9	200.025	6 - ø9	30.2
#7.5	241.3	222.25	8 - ø9	30.2
#8	263.525	244.475	6 - ø11	62
#10	314.325	295.275	8 - ø11	53.8
#11.5	352.425	333.375	8 - ø11	39.6

Outline Drawing (Double Bearing)



DIMENSION (MM)

Model	L	LB	LC	D	E	F	*Xg	Weight	Package
	mm	mm	mm	mm	mm	mm	mm	kg	L x W x H (mm)
PO22	562	472	229	90	82	77	233	112	737*504*620
PO25	642	552	229	90	82	77	247	122	737*504*620
PO28	642	552	229	90	82	77	263	125	737*504*620
PO31	642	552	229	90	82	77	273	131	737*504*620
PO35	642	552	229	90	82	77	293	141	737*504*620
PO40	702	612	274	118	110	100	313	166	807*504*620
PO45	702	612	274	118	110	100	313	182	807*504*620