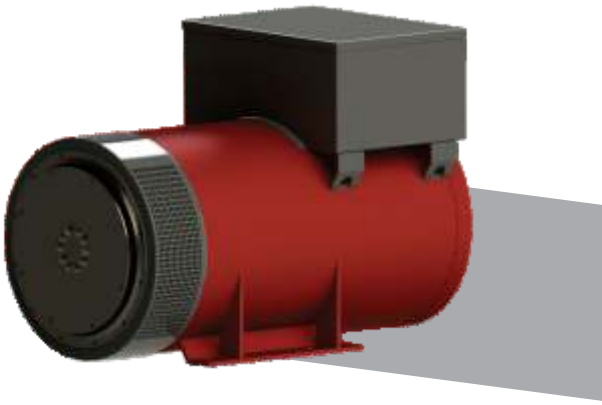
Application and Standard

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-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 F3-110 series 4-pole alternators can be connected to single-phase use when it is specified when ordering.
F3-110 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: F3-110 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. 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**							
Duty type / temp rise / ambient temp		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
PO55	KVA	50	50	50	48	56	**56**	56	52
	KW	*40*	*40*	*40*	*38*	*45*	*45*	*45*	*42*
PO75	KVA	68	68	68	64	76	**76**	76	71
	KW	*54*	*54*	*54*	*51*	*60*	*60*	*60*	*56*
PO90	KVA	80	80	80	76	90	**90**	90	84
	KW	*64*	*64*	*64*	*61*	*72*	*72*	*72*	*67*
PO110	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 / temp rise / ambient temp		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
PO55	KVA	54	58	63	63	59	**63**	69	69
	KW	*43*	*46*	*50*	*50*	*47*	*51*	*55*	*55*
PO75	KVA	73	78	84	84	80	**85**	93	93
	KW	*58*	*62*	*68*	*68*	*64*	*68*	*74*	*74*
PO90	KVA	86	92	100	100	95	**101**	110	110
	KW	*69*	*74*	*80*	*80*	*76*	*81*	*88*	*88*
PO110	KVA	108	115	125	125	118	**127**	138	138
	KW	*86*	*92*	*100*	*100*	*95*	*101*	*110*	*110*

Moment of Inertia & Efficiency

Model	F3-110	PO55	PO75	PO90	PO110
Moment of Inertia (single-bearing).J	kgm^2	0.394	0.525	0.619	0.769
50Hz 400V Efficiency (100% Load)	%	89.3	90.0	91.4	91.5
60Hz 440V Efficiency (100% Load)	%	90.8	91.2	92.5	92.4

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

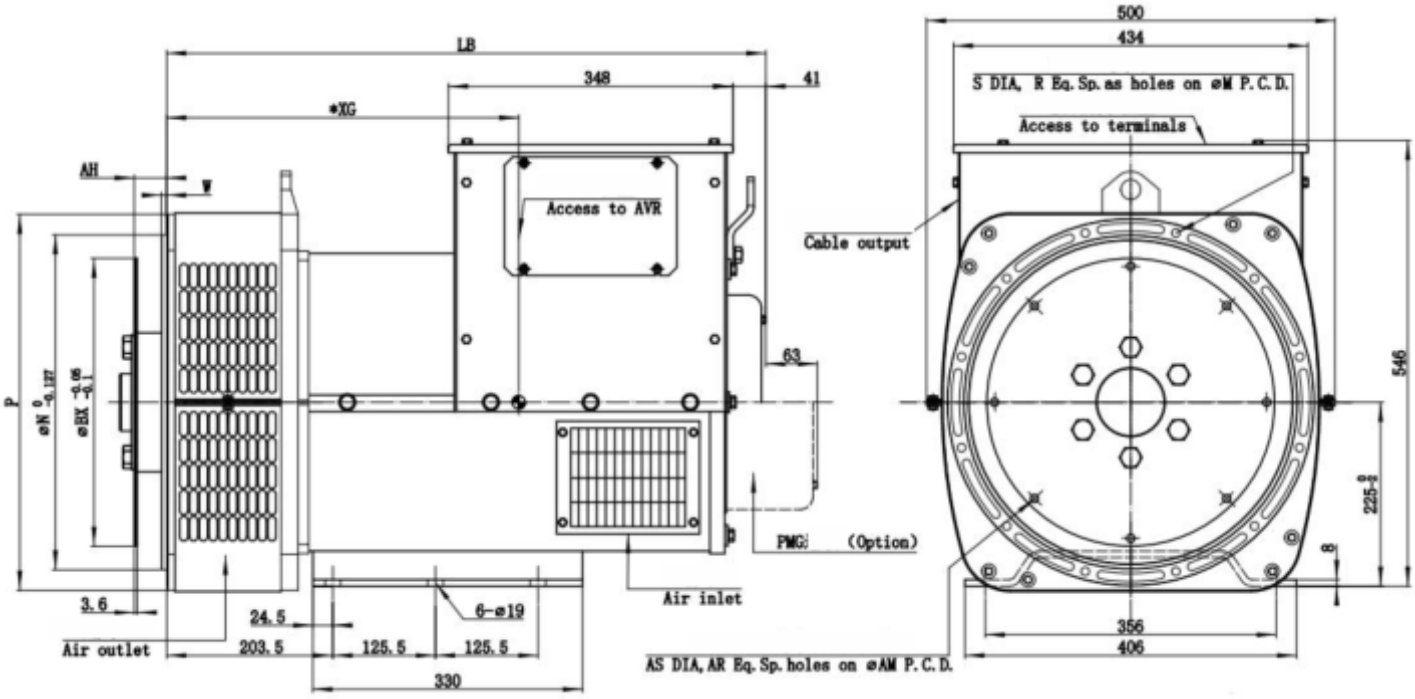
Reactance (%) - Time Constant (ms)

F3-110	50Hz @ 400V	PO55	PO75	PO90	PO110
Kcc	Short circuit ratio	0.35	0.36	0.35	0.36
Xd	Direct axis synchronous unsaturated reactance	290	280	285	274
X'd	Direct Axis Transient Saturation Reactance	18.7	17.2	17.1	16.0
X''d	Direct Axis Subtransient Saturation Reactance	11.2	10.3	10.3	9.6
Xq	Quadrature axis synchronous unsaturated reactance	182	176	178	171
X''q	Quadrature Subtransient Saturation Reactance	16.2	15.2	15.1	14.1
X2	Negative sequence saturation reactance	10.02	9.64	9.77	9.37
X0	Zero sequence unsaturated reactance	0.94	0.75	0.68	0.57
T'd	Short-circuit transient time constant	66	52	46	37
T''d	Subtransient time constant	8	6	6	5
T'do	No-load time constant	2849	2342	2145	1759
Ta	Armature time constant	19	28	36	49

Reactance (%) - Time Constant (ms)

F3-110	60Hz @ 440V	PO55	PO75	PO90	PO110
Kcc	Short circuit ratio	0.29	0.30	0.29	0.31
Xd	Direct axis synchronous unsaturated reactance	345	334	339	326
X'd	Direct Axis Transient Saturation Reactance	22.3	20.5	20.4	19.1
X''d	Direct Axis Subtransient Saturation Reactance	13.4	12.3	12.2	11.5
Xq	Quadrature axis synchronous unsaturated reactance	216	209	212	204
X''q	Quadrature Subtransient Saturation Reactance	19.3	18.0	18.0	16.8
X2	Negative sequence saturation reactance	11.92	11.47	11.63	11.15
X0	Zero sequence unsaturated reactance	1.12	0.89	0.81	0.68
T'd	Short-circuit transient time constant	66	51	46	37
T''d	Subtransient time constant	8	6	6	5
T'do	No-load time constant	3390	2787	2553	2094
Ta	Armature time constant	18	28	36	49

Outline Drawing (Single Bearing)

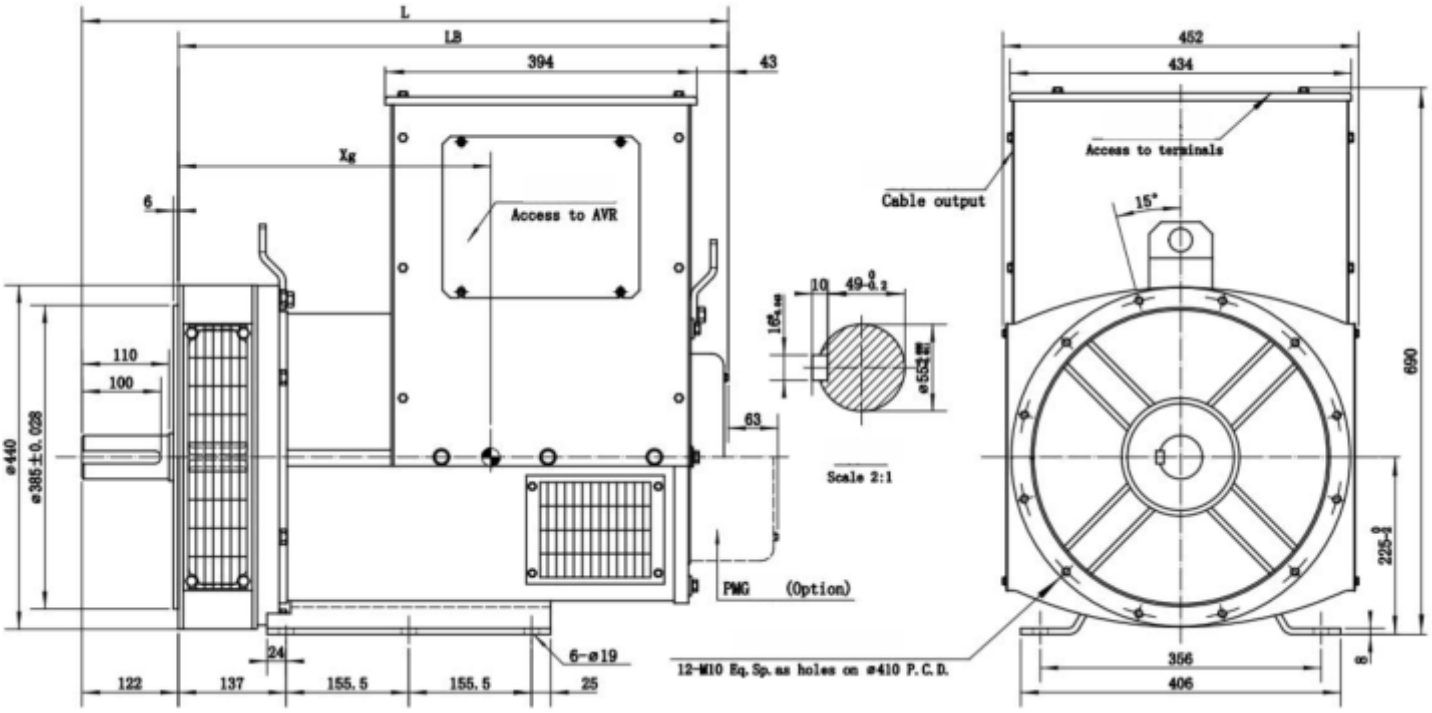


Dimension (mm)					
Model	**LB** SAE1	**LB** SAE2,3,4	***Xg**	**Weight**	**Package**
	mm		mm	kg	L x W x H (mm)
PO55	606	591	279	226	710*560*730
PO75	686	671	306	263	805*560*730
PO90	731	716	326	288	845*560*730
PO110	781	766	361	341	895*560*730

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°
#4	460	361.95	381	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
#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)
PO55	729	607	273	238	810*560*830
PO75	819	697	292	275	905*560*830
PO90	864	742	306	300	945*560*830
PO110				367	995*560*830

If you require any further information, feel free to contact us at **info@potenca.it**