

180 SERIES

SYNCHRONOUS ALTERNATORS

4 POLE 50/60 Hz - THREE PHASE

GENPOWER®

ALTERNATOR

General Information



STANDARD SPECIFICATIONS

General Specifications

Genpower, is an independent and internationally recognized power producer, specializing exclusively on manufacturing of synchronous alternators.

Genpower focuses its corporate mission on original and self-made designs; innovative solutions and provide long-term and sustainable development.

Turkish and foreign technical teams are always working with their knowhow and experience in order to meet universal demands and projects and to have a continuous increase in the performance, total lifespan and overall reliability of the products. Genpower continues the R&D studies with universities both in Turkey and in other countries who have comprehensive knowledge on its products.

Genpower synchronous alternators are proven to endure the harshest environmental applications. They proved to be one of the most reliable and preferred alternator brands all over the world with their brushless and self-exciting system, electronic voltage regulator (AVR), stable wave form, low harmonic distortion and high efficiency.

In case of a demand, Genpower can also produce direct current (DC) alternators, 50-60 Hz low voltage (LV) alternators, medium voltage alternators, high voltage alternators; alternators for light towers, welding alternators, IP44 and PI54 class alternators for marine applications, variable speed alternators for telecom projects and cranes; high frequency alternators for ground power units, radars, planes and helicopters.

Product Application

Genpower alternators are mainly used in the application of diesel, gasoline and gas generator groups. They are also able to operate with steam or hydraulic turbines. They operate in all configurations of emergency generator groups, power plants or continuous power sources.

- Industrial and commercial complex.
- Telecommunication and cell-phone towers, radio and television transmitters
- Defense industry and military projects.
- Construction sites, mining, stone crushers and mixing plants, light towers
- Agriculture and irrigation; cattle and chicken farms
- Hotels and hospitals, lofts, care centers, clinics
- Offices, shops, factories, workshops, buildings, sports complexes, stores, malls, banks, gas stations
- Rental companies, mobile service vehicles, mobile hospitals, and other mobile facilities
- Airports, initial starting of the air vehicles, ground services

Standards

Genpower synchronous alternators are designed and manufactured in compliance with TSE 60034-1; IEC 60034-22; GB755; BS4999-5000; NEMA MG 1.22 CE marking approved and are also accredited with ISO 9001:2008 and ISO 14001:2004.

TECHNICAL SPECIFICATIONS

General Information

Terminal & Terminal Box

Standard generators are 3-phase reconnect able with 12 ends brought out to the terminals, which are mounted on a cover at the non-drive end of the generator. A sheet steel terminal box contains the AVR and provides ample space for the customers' wiring and gland arrangements. It has removable panels for easy access.

Insulation / Impregnation (VPI)

The insulation system is class H. All winding components are impregnated in an unsaturated polyester resin of 200 class temperature. The impregnation provides much needed rigidity and protection against the harsh environment, typical for the generators applications. Genpower alternators are delivered with Genpower insulation system. This insulation system is based on the "Vacuum Pressure Impregnation" (VPI) system which was developed in cooperation with the most renowned suppliers of insulation material all over the world. Using special epoxy based resin; this insulation system ensures perfect winding insulation of the alternators and does not emit harmful gases into the environment.

Dynamic Balancing

The rotating (Main rotor, exciter rotor, diode group, fan) parts are dynamically balanced with greater precision than that required by the Standard TSE EN IEC 60034-14 and ISO2372, ensuring minimum levels of residual unbalance.

Waveforms / Radio Interference

The alternators are designed to give an excellent output waveform. The total harmonic content of line voltage waveform on no load is less than 5% as per limits specified by TSE / IEC Standards.

The Alternators are having negligible Radio Frequency Interference and meets the general limits permitted by VDE 0875 (N). TIF value is <50 and THF value is <2%.

Transient Ratings

Transient voltage drop due to application of full load at 0.8 power factor is less than 18% output voltage recovers to within 3% of the rated value in less than 0.3 seconds.

Continuous Duty / S1 – Ambient Temperature / 40°C

The alternator operates at rated power for an unlimited time with the possibility of overload up to 10% for 1 hour every 12 hours, without damage to its insulation system. The S1, also called continuous or prime duty is applied mainly where there is not another power source available, such as; groups for rental groups for irrigation, refrigeration and application for peak hours. For continuous duty, it is accepted a temperature raise in the windings of up to 125°C.

Standby Duty – Ambient Temperature / 40°C

The generator group operates as energy backup with variable loads in emergency situations in places supplied by the grid / utility company or another main power source. In this kind of duty, the machine does not accept overloads and operates with variable loads up to the rated power of the stand-by duty (40°C). A raise in the winding temperature of up to 150°C is accepted (as per Standard of TSE 60034 / IEC 60034), However if that happens the useful life of the alternator reduces 2 to 6 times. The use of the alternator in stand-by duty is limited to 500 hours a year.

Operating Conditions

When choosing an alternator, "ALTITUDE", "AMBIENT TEMPERATURE" and "POWER FACTOR" should be taken into consideration. Power drops should be calculated with the help of the table below and power determination should be done accordingly.

General Information

Altitude

The rated power refers to installations up to 1000 meter above sea level. For applications over this altitude, the following power correction factor must be applied.

Altitude (m)	<1000	<1500	<2000	<2500	<3000
K Factor	1	0.96	0.93	0.90	0.86

Power Factor (Cos Q)

The nominal power factor is 0.8 lagging. For application with power factor value different from 0.8, the following correction factor must be applied.

Power Factor (CosQ)	0.80	0.70	0.60	0.50	0.30	0
K Factor	1	0.93	0.88	0.84	0.82	0.80

Temperature Rise

Temperature rise is the increase in temperature above ambient temperature 40°C ratings.

Temperature Rise	Temperature °C
B	80°C
F	105°C
H	125°C

Generator Set Ratings

The tables below summarize the definitions accordance to TSE 8528-1 / ISO 8528-1 for the generator set and a combination of TSE 8528-3 / ISO 8528-3 and TSE 60034-1 / IEC 60034-1 for the alternator.

Genset Rating TSE 8528-1	Emergency Standby Power (ESP)	Limited Time Prime Power (LTP)	Prime Rated Power (PRP)	Continuous Operating Power (COP)
Load Type	Variable	Constant	Variable	Constant
Annual Operating Hours	200	500	Unlimited	Unlimited
Average Load	70%	100%	70%	100%
Overload	No	No	10% 1 Hour in every 12	No
Alternator Rating	Standby	Standby	Continuous	Continuous
Duty Cycle	S10	S10	S1	S1
Alternator Ratings	Standby 150/40°C	Standby 150/40°C	Class H 125/40°	Class H 125/40°
	Standby 163/27°C	Standby 163/27°C	Class F 105/40°C	Class F 105/40°C

Ambient Temperature

The rated powers refer to installation with ambient temperature of 40°C. For applications different from 40°C, the following power correction factor must be applied.

Ambient Temperature	30°C	35°C	40°C	45°C	50°C	55°C
K Factor	1.04	1.02	1	0.96	0.93	0.90

Thermal Insulation Class

Insulation class governs the maximum permissible temperature an alternator can operate without damaging the insulation system.

Insulation Class	Maximum Permissible Temperature
F	155°C
H	180°C

Stand-by application allows windings to run hotter than the class H temperature rise limit, therefore for an ambient of;

40°C Temperature Rise : 150°C

27°C Temperature Rise : 163°C

400V – 50 Hz

Alternator Technical Data – 50Hz

4 POLE 1500 RPM 50 Hz

TYPICAL DATA

Insulation class	H	Control system	Self excited
Winding pitch	2/3 - (N° 6)	A.V.R. model	Standard SX460
Wires	12	Voltage regulation	± 1.0 %
Drip proof	IP 23	Sustained short-circuit current	300% (3 IN) : 10s
Altitude	≤ 1000 m	Total harmonic (*) TGH / THC	< 5 %
Overspeed	2250 min-1	Wave form: NEMA = TIF - (*)	< 50
Air flow	0.095 m³/sec.	Wave form: I.E.C. = THF - (*)	< 2 %
Bearing drive	-	Bearing non-drive	6306 - 2RZ

(*) Total harmonic content line to line, at no load or full rated linear and balanced load

50 Hz kVA / kW – Power Factor (CosQ) = 0,8

Duty/Ambient C°	Continuous / 40°C				Stand-by / 27°C				
	H / 125° K				H / 163° K				
Class/C° rise									
Series Star (V)	380/220	400/231	415/240	1 Ph	380/220	400/231	415/240	1 Ph	
Parallel Star (V)	190/110	200/115	208/120	220	190/110	200/115	208/120	220	
Series Delta (V)	240	254	277	230	240	254	277	230	
GNP 180 M	kVA	24	24	25	16	26	26	28	18
	kW	19	19	20	13	21	21	22	14
GNP 180 M1	kVA	27	27	28	18	30	30	31	20
	kW	22	22	22	14	24	24	25	16
GNP 180 M2	kVA	31	31	32	21	34	34	35	23
	kW	25	25	26	17	27	27	28	18
GNP 180 MX	kVA	35	35	36	23	38	38	40	25
	kW	28	28	29	19	30	30	32	20
GNP 180 LA	kVA	40	40	42	27	44	44	46	29
	kW	32	32	34	22	35	35	37	23
GNP 180 LX	kVA	46	46	48	31	51	51	53	34
	kW	37	37	38	25	41	41	42	27
GNP 180 LXA	kVA	50	50	52	33	55	55	57	36
	kW	40	40	42	26	44	44	46	29

REACTANCES (%) – TIME CONSTANTS (ms) : CLASS: H / 400 V

	400 V	180 M	180 M1-M2	180 MX	180 L-LX	180 LXA
VOLTAGE SERIAL STAR						
DIR. AXIS SYNCHRONOUS	Xd	1,68	1,57	1,995	2,038	2,051
DIR. AXIS TRANSIENT	X'd	0,171	0,15	0,153	0,155	0,156
DIR. AXIS SUBTRANSIENT	X''d	0,111	0,111	0,095	0,087	0,085
QUAD. AXIS REACTANCE	Xq	0,84	0,78	0,967	0,99	0,992
QUAD. AXIS SUBTRANSIENT	X''q	0,19	0,17	0,168	0,175	0,173
LEAKAGE REACTANCE	XL	0,069	0,063	0,061	0,065	0,066
NEGATIVE SEQUENCE	X2	0,161	0,141	0,129	0,132	0,13
ZERO SEQUENCE	X0	0,08	0,068	0,45	0,065	0,064

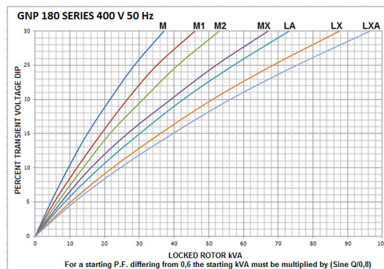
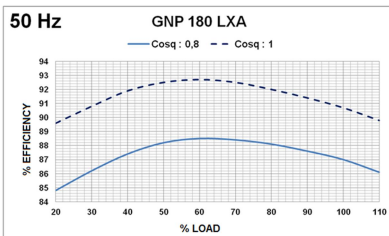
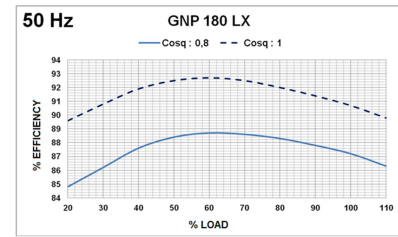
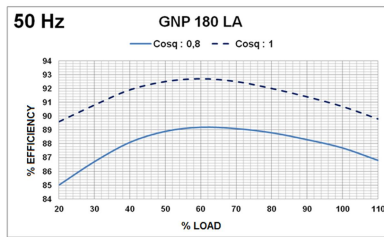
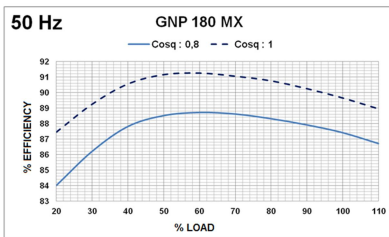
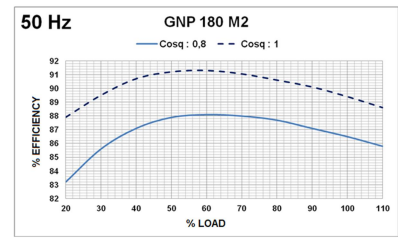
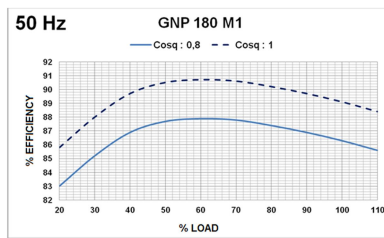
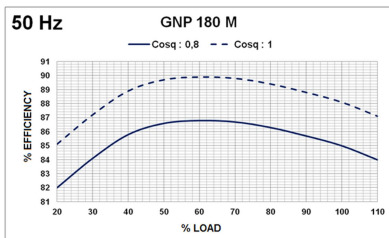
OTHER DATA – CLASS H / 400 V

	400 V	180 M	180 M1-M2	180 MX	180 L-LX	180 LXA
T'd TRANSIENT TIME CONST.		0.02s	0.024 s	0.024 s	0.025 s	0.025 s
T''d SUB-TRANSTIME CONST.		0.005 s	0,0065	0.015 s	0.017 s	0.016 s
T'do O.C. FIELD TIME CONST.		0.4 s	0.5 s	0.58 s	0.59 s	0.57 s
Ta ARMATURE TIME CONST.		0.006 s	0,007	0.012 s	0.011 s	0.105 s
SHORT CIRCUIT RATIO		1/Xd	1/Xd	1/Xd	1/Xd	1/Xd

400V – 50 Hz

STANDARD SPECIFICATIONS

3 Phase / 400V / 50 Hz Efficiency Curves & Percent Transient Voltage Dip & Alternator Windings



ALTERNATOR WINDINGS						
50 Hz - 1500 R.P.M						
4 Pole	3	3	3	3	1	1
Phase						
Connections						
Number of Leads	6	6	12	12	12	12
Standard Winding	380 - 400 - 415V	220 - 240V	380 - 400 - 415V	220 - 240V	190 - 205V	220 - 240V

TECHNICAL SPECIFICATIONS

High quality 100% copper wires are used in the rotors, stators and excitation wirings of GENPOWER alternators. All metal sheets used in the production are siliceous metals. Therefore, GNP alternators have higher efficiency compared to exemplary products.

480V – 60 Hz

Alternator Technical Data – 60Hz

4 POLE 1800 RPM 60 Hz

TYPICAL DATA

Insulation class	H	Control system	Self excited
Winding pitch	2/3 - (N° 6)	A.V.R. model	Standard SX460
Wires	12	Voltage regulation	± 1.0 %
Drip proof	IP 23	Sustained short-circuit current	300% (3 IN) : 10s
Altitude	≤ 1000 m	Total harmonic (*) TGH / THC	< 5 %
Overspeed	2250 min-1	Wave form: NEMA = TIF - (*)	< 50
Air flow	0.119 m³/sec.	Wave form: I.E.C. = THF - (*)	< 2 %
Bearing drive	-	Bearing non-drive	6306 - 2RZ

(*) Total harmonic content line to line, at no load or full rated linear and balanced load

60 Hz kVA / kW – Power Factor (CosQ) = 0,8

Duty/Ambient C° Class/C° rise	Continuous / 40°C H / 125° K				Stand-by / 27°C H / 163° K				
	416/240	440/254	480/277	1 Ph	416/240	440/254	480/277	1 Ph	
	208/120	220/127	240/138	-	208/120	220/127	240/138	-	
Series Star (V)	416/240	440/254	480/277	1 Ph	416/240	440/254	480/277	1 Ph	
Parallel Star (V)	208/120	220/127	240/138	-	208/120	220/127	240/138	-	
Series Delta (V)	208	220	240	240	208	220	240	240	
GNP 180 M	kVA	28	30	30	20	31	33	33	22
	kW	22	24	24	16	25	26	26	18
GNP 180 M1	kVA	34	36	36	24	37	40	40	26
	kW	27	29	29	19	30	32	32	21
GNP 180 M2	kVA	38	40	40	27	42	44	44	29
	kW	30	32	32	22	34	35	35	23
GNP 180 MX	kVA	42	45	45	30	46	50	50	33
	kW	34	36	36	24	37	40	40	26
GNP 180 LA	kVA	45	48	48	32	50	53	53	35
	kW	36	38	38	26	40	42	42	28
GNP 180 LX	kVA	57	61	61	41	63	67	67	45
	kW	46	49	49	33	50	54	54	36
GNP 180 LXA	kVA	58	63	63	42	64	69	69	46
	kW	46	50	50	34	51	55	55	37

REACTANCES (%) – TIME CONSTANTS (ms) : CLASS: H / 480 V

VOLTAGE SERIAL STAR	480 V	180 M	180 M1-M2	180 MX	180 L-LX	180 LXA
DIR. AXIS SYNCHRONOUS	X _d	1,764	1,649	2,095	2,14	2,154
DIR. AXIS TRANSIENT	X' _d	0,18	0,158	0,161	0,163	0,164
DIR. AXIS SUBTRANSIENT	X'' _d	0,117	0,117	0,1	0,191	0,089
QUAD. AXIS REACTANCE	X _q	0,882	0,819	1,015	1,04	1,042
QUAD. AXIS SUBTRANSIENT	X'' _q	0,2	0,179	0,176	0,184	0,182
LEAKAGE REACTANCE	X _L	0,072	0,066	0,064	0,067	0,069
NEGATIVE SEQUENCE	X ₂	0,169	0,148	0,135	0,139	0,137
ZERO SEQUENCE	X ₀	0,084	0,071	0,73	0,068	0,067

OTHER DATA – CLASS H / 480 V

T'd TRANSIENT TIME CONST.	0.02s	0.024 s	0.024 s	0.025 s	0.025 s
T'd SUB-TRANSTIME CONST.	0.005 s	0.0065	0.015 s	0.017 s	0.016 s
T'do O.C. FIELD TIME CONST.	0.4 s	0.5 s	0.58 s	0.59 s	0.57 s
Ta ARMATURE TIME CONST.	0.006 s	0,007	0.012 s	0.011 s	0.105 s
SHORT CIRCUIT RATIO	1/X _d	1/X _d	1/X _d	1/X _d	1/X _d

180 SERIES SYNCHRONOUS ALTERNATORS

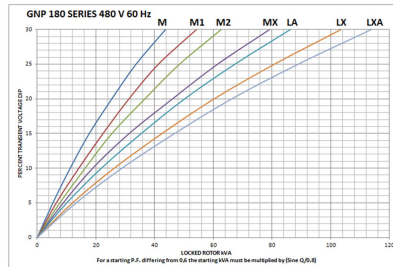
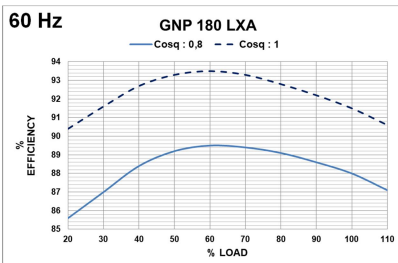
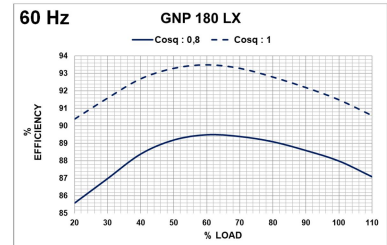
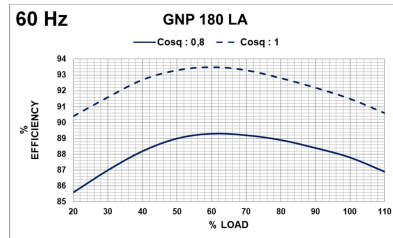
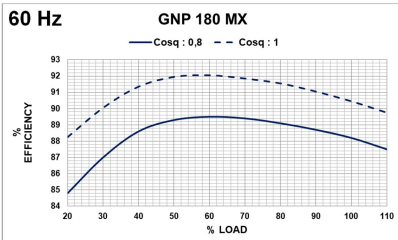
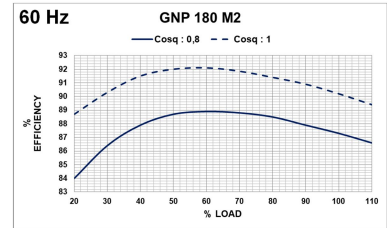
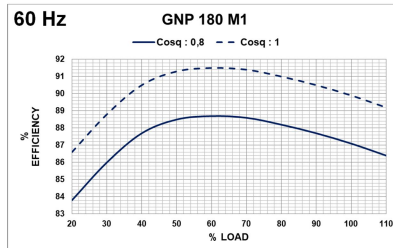
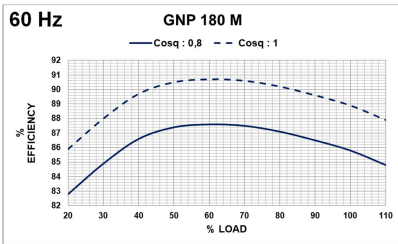
4 POLE 50/60 Hz - THREE PHASE



480V – 60 Hz

STANDARD SPECIFICATIONS

3 Phase / 480V / 60 Hz Efficiency Curves & Percent Transient Voltage Dip & Alternator Windings



ALTERNATOR WINDINGS						
4 Pole	60 Hz - 1800 R.P.M					
Phase	3	3	3	3	1	1
Connections						
Number of Leads	6	6	12	12	12	12
Standard Winding	380-480V	220-277V	380-480V	220-277V	100-240V	220-240V

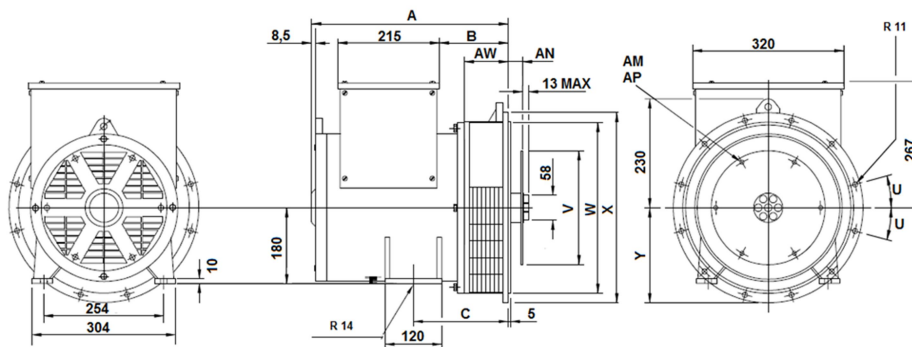
TECHNICAL SPECIFICATIONS

High quality 100% copper wires are used in the rotors, stators and excitation wirings of GENPOWER alternators. All metal sheets used in the production are siliceous metals. Therefore, GNP alternators have higher efficiency compared to exemplary products.

Dimensions

Dimensions

CONNECTION TYPE	SIZE			COUPLING DISC					
SAE	MODEL	A	B	SAE	AN	AM	AP	AR	V
4	180 M-MX	433,5	157	7,5	30,16	8	8,7	222,2	241,2
	180 LA-LXA	523,5	247						
3	180 M-MX	433,5	147	11,5	39,68	8	11	333,4	352,3
	180 LA-LXA	523,5	237						
FLANGE ADAPTER									
SAE	AW	R	S	T	U	W	X	C	Y
4	95	12	11	381	15	361,9	402	203	201
3	105			428,6		409,5	451	213	225,5



Special Products / Non - Standardized

Light Tower Alternators
 Welding Alternators
 High Frequency Alternators
 Variable Speed Alternators

Direct Current Alternators - (DC)
 Medium Voltage Alternators - (MV)
 High Voltage Alternators - (HV)
 IP44 and IP54 Class Alternators - (Marine)

Quality Documents & Certificates

Trademark Registration Certificate
 Capacity Report (32400 Units / Year)
 ISO 9001 - 2015 Certificate
 ISO 14001 - 2015 Certificate
 OHSAS 18001 - 2007 Certificate

Industrial Registry Certificate
 Certificate of Manufacturing Competence
 TSE- Service Adequacy Certificate
 TS EN 60034 - 1 Certificate

TSE – Turkish Standards Institution Certificate
 Certificate of Competency for After Sales Services
 Made in Turkey Certificate- For Generator/ 1 - 5000 kVA

