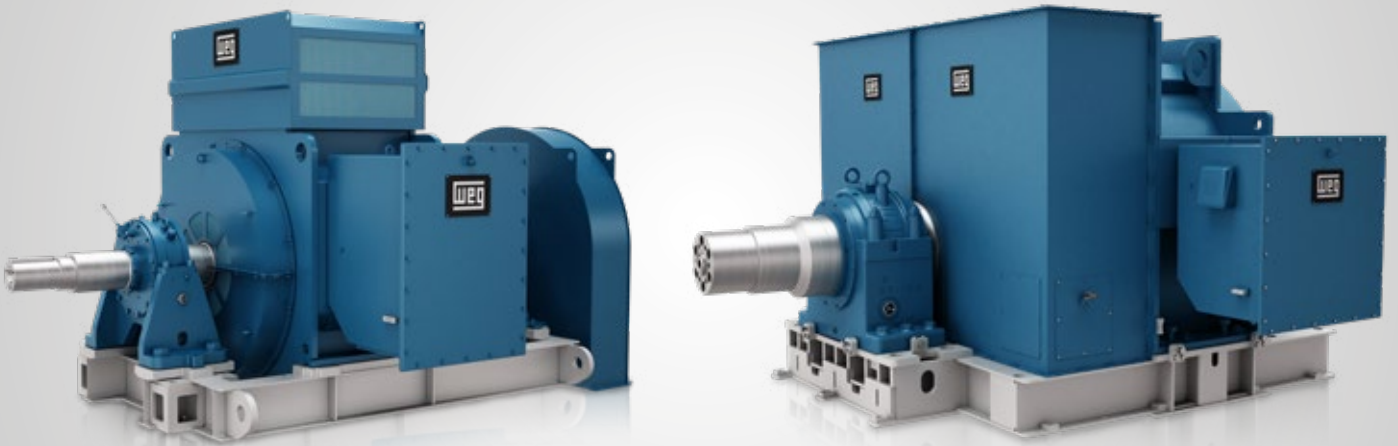


HYDROGENERATORS

Power generation with reliability,
innovation and performance



Motors | Automation | Energy | Transmission & Distribution | Coatings



POWER GENERATION WITH RELIABILITY, INNOVATION AND PERFORMANCE

Hydrogenerators

Designed for applications in hydro power plants, WEG hydrogenerators offer a wide range of options both for output and speed. With our experience and the benefit of extensive market research we have designed a range of hydrogenerators suitable to be driven by Kaplan, Francis and Pelton turbines, among others, offering different mechanical and electrical configurations.

Technical Features

- Output: 300 up to 150,000 kVA
- Voltage: up to 13,800 V
- Frequency: 50 or 60 Hz
- Degree of protection: IP20 up to IP24
- Speed: 1,200 up to 120 rpm
- Mounting: horizontal and vertical



Design

WEG hydrogenerators are designed with advanced software available on the market, many of them specially developed in partnerships with universities in Europe, the USA and Brazil. These tools ensure accuracy and reliability during the design process and result in high efficiency and low-maintenance.

Certifications

WEG's quality system is certified to ISO 9001 and ISO 14001 standards and is audited and certified by the Bureau Veritas Quality Institute. WEG hydrogenerators can be supplied, upon request, with certifications from world leading certification bodies and are suitable for operation in the most demanding applications.

Sustainability

Sustainability is a key feature in WEG's development and manufacture process consideration always given to the preservation of the environment. Equipment such as hydrogenerators, turbines, electrical panels, switchgears, transformers, digital monitoring and control systems and all other equipment and services required for the implementation of WEG's hydro power plants all form part of the company product portfolio supplied to hydro power plants.

Hydro power plants are recognized today as one of the most important clean and renewable energy sources on global scale supplying around 20% of the world's electricity.

GH30 Hydrogenerators

The GH30 line hydrogenerators were designed in order to meet the requirements of Mini Hydro and Small Hydro Power Plants. The line concept allows easy flexibility of electromagnetic designs to meet the diverse needs of applications, especially to be coupled to Francis, Kaplan and Pelton turbines.

Benefits



Optimization of the generator's weight x output



Flexibility of electromagnetic projects



Reduced maintenance



Sized according to the turbine runaway speed



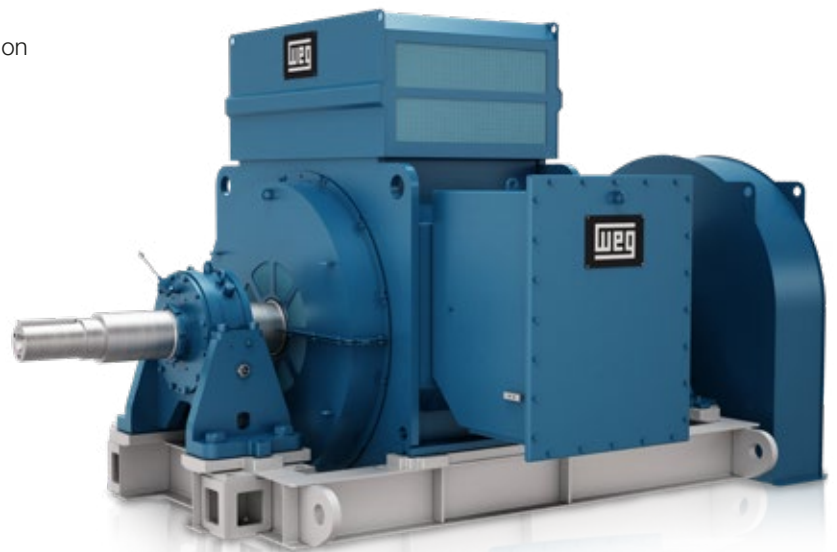
Rolling or sleeve bearings

Application Range

The GH30 line hydrogenerators operate in the application range and technical characteristics presented below:

- Output: 950 up to 3,000 kVA
- Number of poles: 10 up to 24
- Voltage: 480 up to 4,160 V
- Frequency: 60 Hz
- Mounting type: horizontal
- Excitation brushless

Note: other features under request.



Construction Features

Frame

The frame of the GH30 line was developed guaranteeing the necessary rigidity for the application. It can be manufactured from carbon steel sheets that are cut, bent and welded according to the power of the hydrogenerator. The frame already has the necessary cutouts for the air inlet and outlet and for fixing the main junction boxes and accessories, ensuring more agility and quality in the manufacturing process.



Bearings

The GH30 Hydro bearings have been developed for easy maintenance and high reliability of operation. The design of the bearings can withstand both radial and axial loads from the hydraulic turbine and flywheel. This bearing design reduces the length of the generator turbine assembly. The bearings are extremely robust against lubrication failures, thus avoiding the need for complex monitoring systems.

Terminal Box

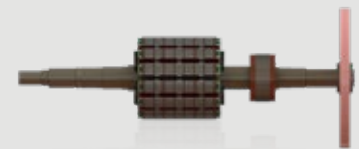
The main terminal box of the GH30 Hydro line was developed to meet the low and medium voltage segment. It has 6 terminals with access to the neutral leads.

Cylindrical Shaft

The GH30 Hydro line has cylindrical shafts, i.e. rib-free, with shaft ends according to the IEC/NEMA standard. Shafts are also designed to meet the internal criteria for fatigue, stress concentration, compressive strength, torsional resistance, flexural strength and tensile strength, as well as static deformation and torsional stiffness.

Integrated Inertia Flywheel

When necessary, the flywheel is integrated directly into the generator shaft. The generator bearings are sized to support the flywheel, reducing the size of the generating unit and maintenance costs.



Instrumentation

The GH30 Hydro line is supplied with protection devices such as: thermal sensors, voltage and current measurement devices and speed sensors. The sensors are used to improve and monitor the operation of the generator, bringing greater reliability to its operation.



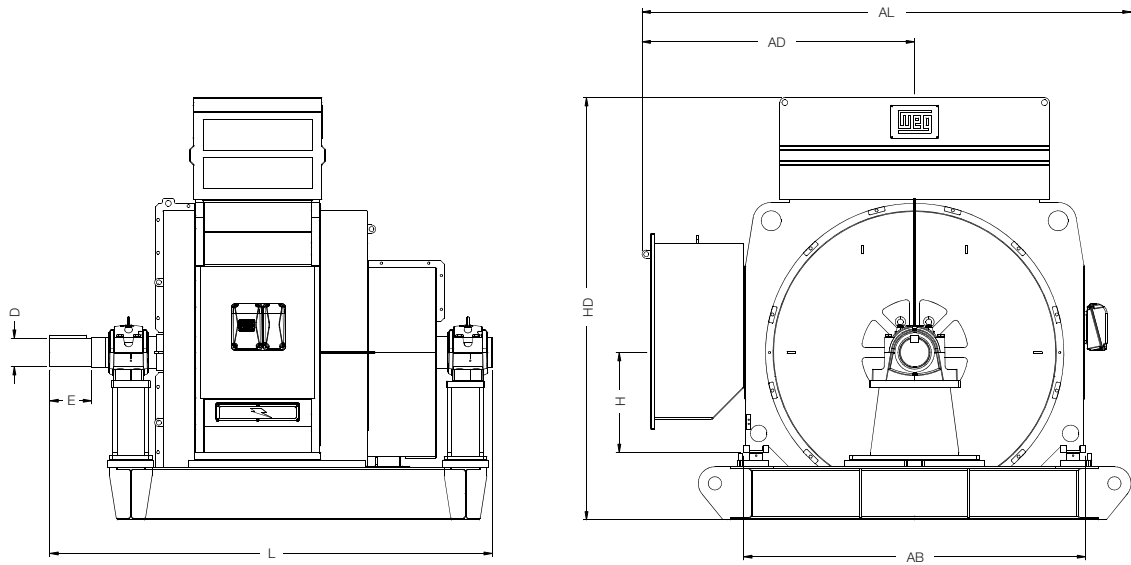
Output (kVA)

60 Hz - PF 0.9					
Poles / Speed	Frame				
	Elevation F - 690 V				
	630	710	800	900	1000
10 / 720 rpm	2,400	-	-	-	-
12 / 600 rpm	2,000	2,400			
14 / 514 rpm	1,500	2,000	2,400		
16 / 450 rpm	1,000	2,100	2,400	2,400	
18 / 400 rpm	950	1,800	2,400	2,400	
20 / 360 rpm	-	1,400	2,000	2,400	
22 / 327.3 rpm		1,000	2,000	2,400	
24 / 300 rpm		-	1,600	2,400	

60 Hz - PF 0.9						
Poles / Speed	Frame					
	Elevation F - 4,160 V					
	630	710	800	900	1000	
10 / 720 rpm	3,000	-	-	-	-	
12 / 600 rpm	2,000	3,000				
14 / 514 rpm	1,500	2,000	3,000			
16 / 450 rpm	1,100	2,000	2,500	3,000		
18 / 400 rpm	950	1,800	2,500	3,000		
20 / 360 rpm	-	1,300	2,000	2,500		3,000
22 / 327.3 rpm		1,000	2,000	2,500		3,000
24 / 300 rpm		-	1,800	2,300		3,000

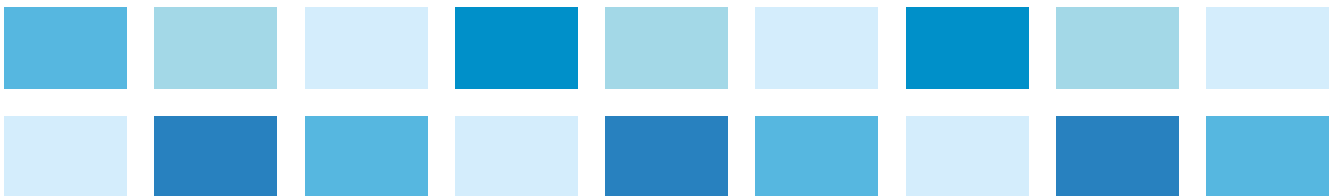


Mechanical Features



Dimensions (mm)								
Frame	D	E	H	L	AB	AD	AL	HD
630	140	200	470	2,590	1,720	1,470	2,540	1,890
710	160	260	640	2,620	1,870	1,550	2,770	2,130
800	170	250	640	2,700	2,050	1,640	2,940	2,320
900	200	270	800	2,740	2,240	1,725	3,080	2,610
1,000	250	300	800	2,945	2,440	1,825	3,300	2,790

Note: dimensions may vary due to power variation, bearings, terminal box or to meet technical requirements.



GH11 and SH11 Hydrogenerators

WEG produces hydrogenerators for all types of hydraulic turbines.

For applications in hydro power plants, WEG developed a standardized line of hydrogenerators that vary with the characteristics of each installation, thus expanding the application possibilities with great versatility.

The GH11 line was developed to meet the most common applications with smaller and simpler machines, i. e. for application of machines where not so high axial loading and inertia loads are present, no high runaway speeds are generated, etc.

This standardization allows a very practical option for the hydrogenerator in simpler solutions without losing the high efficiency and quality levels.

The SH11 line, on the other hand, with a compact and robust structure, allows the hydrogenerator to operate safely in typical load rejection and high runaway speed conditions, enabling, at the same time, the generator to run with higher inertia loads.

Advantages of GH11 and SH11 Lines

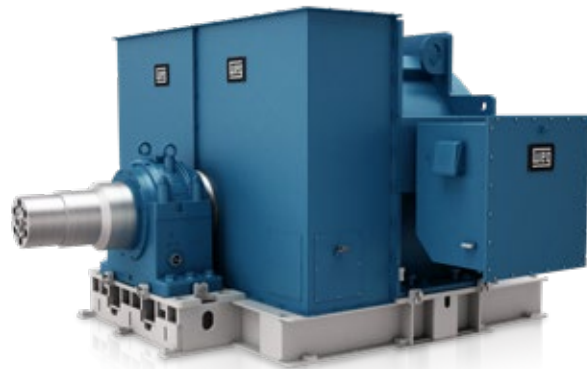
- Predefinition of the basic hydrogenerator features
- Pre-design of the main hydrogenerator components
- Manufacturing process similar to the series production
- Reduced delivery lead-time
- Easy installation & start-up

Excitation System

The hydrogenerators can be supplied with the following excitation systems:

- Brushless with/without auxiliary exciter (PMG)
- Static exciter (with brushes) – only SH11

WEG produces the GH11 and SH11 lines both for horizontal mounting always seeking the best alternative for cost reduction, area reduction required for installation and efficiency optimization.



GH11 Line

The GH11 line is an optimized hydrogenerator line aiming at high performance and cost reduction. They are suitable where there is no requirement of high inertia and the hydraulic loads are supported by the turbine bearings.

Range of Application

The GH11 lines can be supplied with the following technical data:

- Output range: 500 kVA to 11,500 kVA
- Number of poles: 4 to 18
- Rated voltage: 400 V to 11,000 V for 50 Hz
480 V to 13,800 V for 60 Hz

Note: other voltages upon request.

GH11 Line

Power ranges were established for the development of the GH11 line, each one corresponding to one hydrogenerator and providing the respective reference code. Table 1 shows the full application range of the GH11 line.

GH11									
Code	Output range (kVA)	400 V / 50 Hz	480 V / 60 Hz	3,300 V / 50 Hz	4,160 V / 60 Hz	6,300 V / 50 Hz	6,600 V / 60 Hz	11,000 V / 50 Hz	13,800 V / 60 Hz
C	>1,000 ≤1,400	•	•	•	•	•	•		
D	>1,400 ≤1,600	•	•	•	•	•	•		
E	>1,600 ≤1,800	•	•	•	•	•	•		
F	>1,800 ≤2,000	•	•	•	•	•	•		
G	>2,000 ≤2,250		•	•	•	•	•		
H	>2,250 ≤2,500		•	•	•	•	•		
I	>2,500 ≤2,800			•	•	•	•		
J	>2,800 ≤3,150			•	•	•	•		
K	>3,150 ≤3,550			•	•	•	•		
L	>3,550 ≤4,000			•	•	•	•		
M	>4,000 ≤4,500			•	•	•	•		
N	>4,500 ≤5,000			•	•	•	•		
O	>5,000 ≤5,600			•	•	•	•		
P	>5,600 ≤6,300			•	•	•	•		
Q	>6,300 ≤7,100							•	•
R	>7,100 ≤8,000							•	•
S	>8,000 ≤9,000							•	•
T	>9,000 ≤10,000							•	•
U	>10,000 ≤11,200							•	•

Table 1 - Application range of the GH11 line

GH11 Line - Hydrogenerators Reference Models - 50 Hz

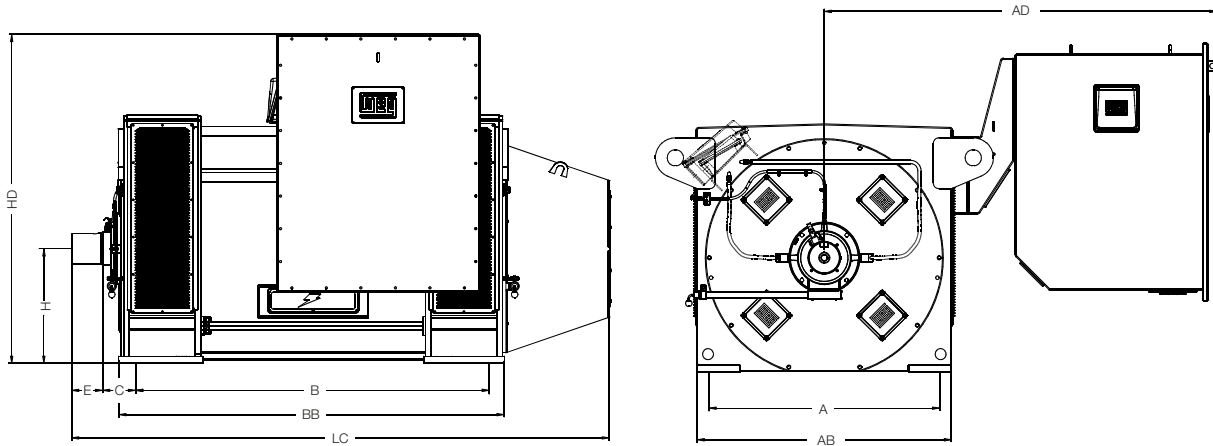
Poles/rpm	Output range code																	
	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
8/750	-	-	-	-	-	-	63I08	63J08	63K08	07L08	07M08	07N08	07O08	08P08	08Q08	09R08	09S08	09T08
10/600	-	-	-	-	63G10	63H10	63I10	07J10	07K10	07L10	07M10	08N10	08O10	08P10	09Q10	09R10	09S10	10T10
12/500	-	63D12	63E12	63F12	07G12	07H12	07I12	07J12	08K12	08L12	08M12	08N12	09O12	09P12	09Q12	10R12	10S12	10T12
14/429	63C14	63D14	07E14	07F14	07G14	07H14	07I14	08J14	08K14	08L14	08M14	09N14	09O14	09P14	10Q14	10R14	10S14	-
16/375	07C16	07D16	07E16	07F16	08G16	08H16	08I16	08J16	08K16	09L16	09M16	09N16	09O16	10P16	10Q16	-	-	-
18/333	07C18	07D18	07E18	08F18	08G18	08H18	08I18	09J18	09K18	09L18	09M18	10N18	10O18	10P18	-	-	-	-

GH11 Line - Hydrogenerators Reference Models - 60 Hz

Poles/rpm	Output range code																		
	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
8/900	-	-	-	-	-	-	-	63J08	63K08	63L08	07M08	07N08	07O08	07P08	08Q08	08R08	09S08	09T08	09U08
10/720	-	-	-	-	-	-	63I10	63J10	63K10	07L10	07M10	07N10	08O10	08P10	09Q10	09R10	09S10	09T10	10U10
12/600	-	-	-	63F12	63G12	63H12	07I12	07J12	07K12	07L12	08M12	08N12	08O12	08P12	09Q12	09R12	10S12	10T12	10U12
14/514	63C14	63D14	63E14	07F14	07G14	07H14	07I14	07J14	08K14	08L14	08M14	08N14	09O14	09P14	10Q14	10R14	10S14	10T14	-
16/450	63C16	63D16	07E16	07F16	07G16	07H16	08I16	08J16	08K16	08L16	08M16	09N16	09O16	09P16	10Q16	10R16	-	-	-
18/400	07C18	07D18	07E18	07F18	07G18	08H18	08I18	08J18	08K18	09L18	09M18	09N18	10O18	10P18	10Q18	-	-	-	-

Mechanical Features

Typical Dimensions



Frame (IEC)	Dimensions (mm)									
	A	AB	AD ¹⁾	B ²⁾	BB ²⁾	C ³⁾	E ³⁾	H	HD	LC ⁴⁾
63 (630)	1,160	1,400	1,230-2,000	1,760-1,910	2,030-2,140	240	170	630	1,360	3,000-3,075
07 (710)	1,300	1,600	1,340-2,100	1,920-2,090	2,160-2,330	260	230	710	1,530	3,300-3,450
08 (800)	1,600	1,850	1,450-2,250	1,835-2,275	2,125-2,565	285	250	800	1,700	3,250-3,700
09 (900)	1,750	2,000	1,525-2,375	1,950-2,470	2,260-2,780	320	280	900	1,905	3,450-3,900
10 (1000)	1,950	2,200	1,625-2,450	2,275-2,480	2,585-2,790	320	310	1,000	2,105	3,800-4,050

Notes: 1) According to the voltage: 400 V, 480 V, 3,300 V, 4,160 V, 6,300 V, 6,600 V, 11,000 V and 13,800 V.

2) According to the output.

3) According to the bearing type: rolling bearing and sleeve bearing.

4) According to the output and arrangement.



SH11 Line

The SH11 line is a compact and rugged hydrogenerator line designed to meet the different application demands of/turbine + hydrogenerator arrangements. The SH11 line was designed to improve the electrical and mechanical features allowing the generator to operate with higher inertia loads in a compact design, meet higher hydraulic loads and withstand adverse conditions such as load rejection or high runaway speeds without losing the reliability of WEG products.

Range of Application

The SH11 line can be supplied with the following technical data:

- Output range: 1,400 kVA to 18,000 kVA
- Number of poles: 8 to 36
- Rated voltage: 3,300 V to 11,000 V for 50 Hz
4,160 V to 13,800 V for 60 Hz

Note: other voltages upon request.

Power ranges were established for the development of the SH11 line, each one corresponding to one hydrogenerator and providing the respective reference code. Table 2 shows the full application range of the SH11 line.

SH11							
Code	Output range (kVA)	3,300 V / 50 Hz	4,160 V / 60 Hz	6,600 V / 50 Hz	6,900 V / 60 Hz	11,000 V / 50 Hz	13,800 V / 60 Hz
C	>1,000 ≤1,400	•	•	•	•		
D	>1,400 ≤1,600	•	•	•	•		
E	>1,600 ≤1,800	•	•	•	•		
F	>1,800 ≤2,000	•	•	•	•		
G	>2,000 ≤2,250	•	•	•	•		
H	>2,250 ≤2,500	•	•	•	•		
I	>2,500 ≤2,800	•	•	•	•		
J	>2,800 ≤3,150	•	•	•	•		
K	>3,150 ≤3,550	•	•	•	•		
L	>3,550 ≤4,000	•	•	•	•		
M	>4,000 ≤4,500	•	•	•	•		
N	>4,500 ≤5,000	•	•	•	•		
O	>5,000 ≤5,600	•	•	•	•		
P	>5,600 ≤6,300	•	•	•	•		
Q	>6,300 ≤7,100					•	•
R	>7,100 ≤8,000					•	•
S	>8,000 ≤9,000					•	•
T	>9,000 ≤10,000					•	•
U	>10,000 ≤11,200					•	•
V	>11,200 ≤12,500					•	•
W	>12,500 ≤14,000					•	•
X	>14,000 ≤16,000					•	•
Y	>16,000 ≤18,000					•	•

Table 2 - Application range of the SH11 line

SH11 Line

SH11 Line - Hydrogenerators Reference Models - 50 Hz

Output range code																							
Poles/ rpm	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	X	Y	Z
8/750	-	-	-	-	-	-	-	-	-	07L08	07M08	07N08	07O08	08P08	08Q08	09R08	09S08	09T08	10U08	10V08	11X08	11Y08	11Z08
10/600	-	-	-	-	-	-	-	07J10	07K10	07L10	07M10	08N10	08O10	08P10	09Q10	09R10	09S10	10T10	10U10	11V10	11X10	11Y10	12Z10
12/500	-	-	-	-	07G12	07H12	07I12	07J12	08K12	08L12	08M12	08N12	09O12	09P12	09Q12	10R12	10S12	10T12	10U12	11V12	11X12	12Y12	12Z12
14/429	-	-	07E14	07F14	07G14	07H14	07I14	08J14	08K14	08L14	08M14	09N14	09O14	09P14	10Q14	10R14	10S14	11T14	11U14	12V14	12X14	12Y14	14Z14
16/375	07C16	07D16	07E16	07F16	08G16	08H16	08I16	08J16	08K16	09L16	09M16	09N16	09O16	10P16	10Q16	11R16	11S16	11T16	12U16	12V16	14X16	14Y16	16Z16
18/333	07C18	07D18	07E18	08F18	08G18	08H18	08I18	09J18	09K18	09L18	09M18	10N18	10O18	10P18	11Q18	11R18	12S18	12T18	14U18	14V18	16X18	16Y18	16Z18
20/300	08C20	08D20	08E20	09F20	09G20	09H20	09I20	09J20	10K20	10L20	10M20	10N20	11O20	11P20	12Q20	12R20	12S20	14T20	14U20	16V20	16X20	16Y20	16Z20
22/273	08C22	09D22	09E22	09F22	10G22	10H22	10I22	10J22	10K22	11L22	11M22	11N22	11O22	11P22	12Q22	12R22	14S22	14T22	16U22	16V22	18X22	18Y22	18Z22
24/250	08C24	09D24	09E24	09F24	10G24	10H24	10I24	10J24	11K24	11L24	11M24	11N24	12O24	12P24	12Q24	14R24	14S24	16T24	16U24	16V24	18X24	18Y24	18Z24
26/231	09C26	09D26	09E26	10F26	10G26	10H26	10I26	11J26	11K26	11L26	12M26	12N26	12O26	14P26	14Q26	16R26	16S26	16T26	16U26	18V26	18X26	18Y26	-
28/214	09C28	09D28	10E28	10F28	10G28	10H28	11I28	11J28	11K28	11L28	12M28	12N28	12O28	14P28	16Q28	16R28	16S28	16T28	18U28	18V28	18X28	-	-
30/200	10C30	10D30	10E30	10F30	11G30	11H30	11I30	11J30	12K30	12L30	12M30	12N30	14O30	14P30	16Q30	16R30	16S30	18T30	18U30	18V30	-	-	-
32/188	10C32	10D32	11E32	11F32	11G32	11H32	11I32	12J32	12K32	12L32	14M32	14N32	14O32	16P32	16Q32	16R32	18S32	18T32	18U32	-	-	-	-
34/176	10C34	11D34	11E34	11F34	11G34	12H34	12I34	12J34	12K34	14L34	14M34	16N34	16O34	16P34	16Q34	18R34	18S34	18T34	-	-	-	-	-
36/167	11C36	11D36	11E36	11F36	12G36	12H36	12I36	12J36	14K36	14L36	14M36	16N36	16O36	16P36	18Q36	18R36	18S36	-	-	-	-	-	-

SH11 Line - Hydrogenerators Reference Models - 60 Hz

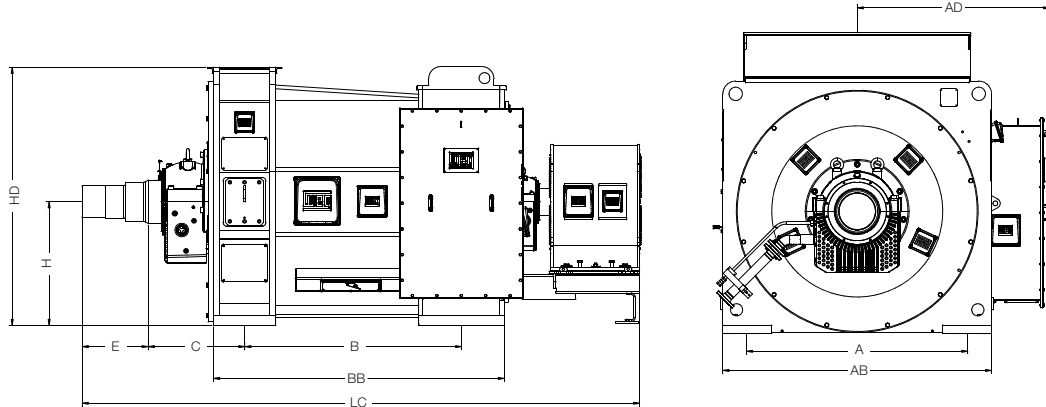
Output range code																							
Poles/ rpm	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	X	Y	Z
8/900	-	-	-	-	-	-	-	-	-	-	07M08	07N08	07O08	07P08	08Q08	08R08	09S08	09T08	09U08	10V08	10X08	11Y08	11Z08
10/720	-	-	-	-	-	-	-	-	-	07L10	07M10	07N10	08O10	08P10	09Q10	09R10	09S10	09T10	10U10	10V10	11X10	11Y10	11Z10
12/600	-	-	-	-	-	-	07I12	07J12	07K12	07L12	08M12	08N12	08O12	08P12	09Q12	09R12	10S12	10T12	10U12	10V12	11X12	11Y12	12Z12
14/514	-	-	-	07F14	07G14	07H14	07I14	07J14	08K14	08L14	08M14	08N14	09O14	09P14	10Q14	10R14	10S14	10T14	11U14	11V14	12X14	12Y14	12Z14
16/450	-	-	07E16	07F16	07G16	07H16	08I16	08J16	08K16	08L16	08M16	09N16	09O16	09P16	10Q16	10R16	11S16	11T16	11U16	12V16	12X16	14Y16	14Z16
18/400	07C18	07D18	07E18	07F18	07G18	08H18	08I18	08J18	08K18	09L18	09M18	09N18	10O18	10P18	10Q18	11R18	11S18	11T18	12U18	14V18	14X18	16Y18	16Z18
20/360	08C20	08D20	08E20	08F20	08G20	09H20	09I20	09J20	09K20	09L20	10M20	10N20	10O20	11P20	11Q20	11R20	12S20	12T20	14U20	14V20	16X20	16Y20	16Z20
22/327	08C22	08D22	09E22	09F22	09G22	10H22	10I22	10J22	10K22	10L22	11M22	11N22	11O22	11P22	12Q22	12R22	14S22	14T22	14U22	16V22	16X22	18Y22	18Z22
24/300	08C24	08D24	09E24	09F24	09G24	10H24	10I24	10J24	10K24	11L24	11M24	11N24	11O24	12P24	12Q24	12R24	14S24	14T24	16U24	16V24	16X24	18Y24	18Z24
26/277	09C26	09D26	09E26	09F26	10G26	10H26	10I26	10J26	11K26	11L26	11M26	12N26	12O26	12P26	14Q26	14R26	14S26	16T26	16U26	16V26	18X26	18Y26	18Z26
28/257	09C28	09D28	09E28	10F28	10G28	10H28	10I28	11J28	11K28	11L28	11M28	12N28	12O28	12P28	14Q28	14R28	16S28	16T28	16U28	16V28	18X28	18Y28	-
30/240	09C30	10D30	10E30	10F30	10G30	10H30	11I30	11J30	11K30	11L30	12M30	12N30	12O30	14P30	16Q30	16R30	16S30	16T30	18U30	18V30	18X30	-	-
32/225	10C32	10D32	10E32	10F32	11G32	11H32	11I32	11J32	11K32	12L32	12M32	12N32	14O32	14P32	16Q32	16R32	16S32	18T32	18U32	18V32	-	-	-
34/212	10C34	10D34	10E34	11F34	11G34	11H34	11I34	12J34	12K34	12L34	14M34	14N34	14O34	14P34	16Q34	16R34	18S34	18T34	18U34	-	-	-	-
36/200	11C36	11D36	11E36	11F36	11G36	11H36	12I36	12J36	12K36	12L36	14M36	14N36	14O36	16P36	16Q36	16R36	18S36	18T36	-	-	-	-	-



Mechanical Features

Typical Dimensions

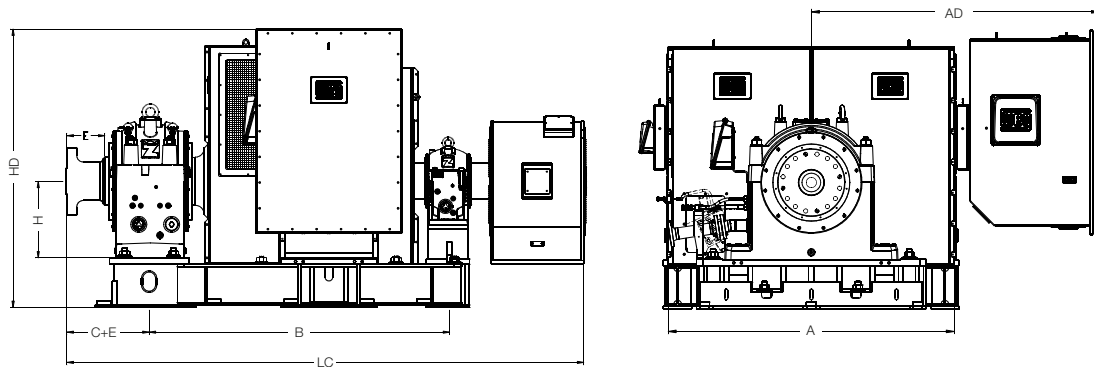
Mounting IM 1001 / IM 1005



Frame (IEC)	Dimensions (mm)									
	A	AB	AD ¹⁾	B ²⁾	BB ²⁾	C ³⁾	E ³⁾	H	HD	LC ⁴⁾
07 (710)	1,700	2,000	1,650-2,000	1,430-2,330	2,050-2,600	900	400-1,000	900	1,905	3,600-4,600
08 (800)	1,860	2,200	1,750-2,100	1,530-2,440	1,700-2,550	1,000	400-1,000	1,000	2,100	3,400-4,800
09 (900)	2,070	2,450	1,900-2,250	1,800-2,530	2,000-2,800	1,120	400-1,000	1,120	2,340	3,900-5,300
10 (1000)	2,260	2,700	2,000-2,350	1,800-2,560	2,100-2,800	1,250	400-1,000	1,250	2,620	4,000-5,400

- Notes: 1) According to the voltage: 3,300 V up to 13,800 V.
 2) According to the output.
 3) According to the arrangement: G, K or B.
 4) According to the output and arrangement.

Mounting IM 7311 / IM 7315



Frame (IEC)	Dimensions (mm)							
	A	AD ¹⁾	B ²⁾	C + E ³⁾	E ³⁾	H ⁵⁾	HD ⁵⁾	LC ⁴⁾
08 (800)	2,450	1,875-2,225	2,300-3,000	650-1,300	100-500	375-600	1,550-1,775	3,900-5,350
09 (900)	2,650	1,975-2,325	2,400-3,100	650-1,300	100-500	375-600	1,670-1,895	3,900-5,350
10 (1000)	2,950	2,125-2,475	2,600-3,200	730-1,450	100-500	375-600	1,780-2,005	4,000-5,500
11 (1120)	3,200	2,250-2,600	2,700-3,450	730-1,450	100-500	375-670	1,900-2,195	4,100-5,600
12 (1250)	3,450	2,450-2,800	3,000-3,450	730-1,450	100-500	375-670	2,050-2,345	4,300-5,600
14 (1400)	3,700	2,550-2,900	3,300-3,550	850-1,550	100-500	375-670	2,160-2,455	5,000-6,000
16 (1800)	4,200	2,800-3,150	3,300-3,500	850-1,550	100-500	375-670	2,395-2,670	5,000-6,000
18 (1800)	4,460	3,950-4,300	3,500-3,600	850-1,550	100-500	375-670	2,150-2,805	5,100-6,000

- Notes: 1) According to the voltage: 6,900 V and 13,800 V.
 2) According to the output.
 3) According to the arrangement: G, K or B.
 4) According to the output and arrangement.
 5) According to the output, inertia, arrangement and axial loads.

SH11 Line

Shaft End Deflection

Another important construction aspect to be considered for the correct design of the hydrogenerator is the shaft end deflection, mainly in the area of the mechanical shaft seal in the turbine shield. If large shaft end deflections are present, the use of a special seal in the turbine is required to avoid a drop of the hydraulic performance of the turbine.

The shaft end deflection is directly related to the following factors:

- Hydraulic radial loads generated by the turbine
- Bearing arrangement (with turbine in balance or turbine with own bearings)
- Shaft dimensioning
- Selection of bearing size

Efficiency

The current need for a better use of energetic resources led WEG to develop new designs and manufacturing methods that resulted in higher efficiencies ensuring the SH11 line meets the IEC 60034-1 requirements..

Inertia

The SH11 line was designed with the purpose of improving the electrical and mechanical design allowing the generator to operate with higher inertia loads in compact types without losing the reliability and efficiency of WEG products.

Maximum Speed

Figure 1 shows the maximum speed (runaway speed) according to hydrogenerator rated speed.

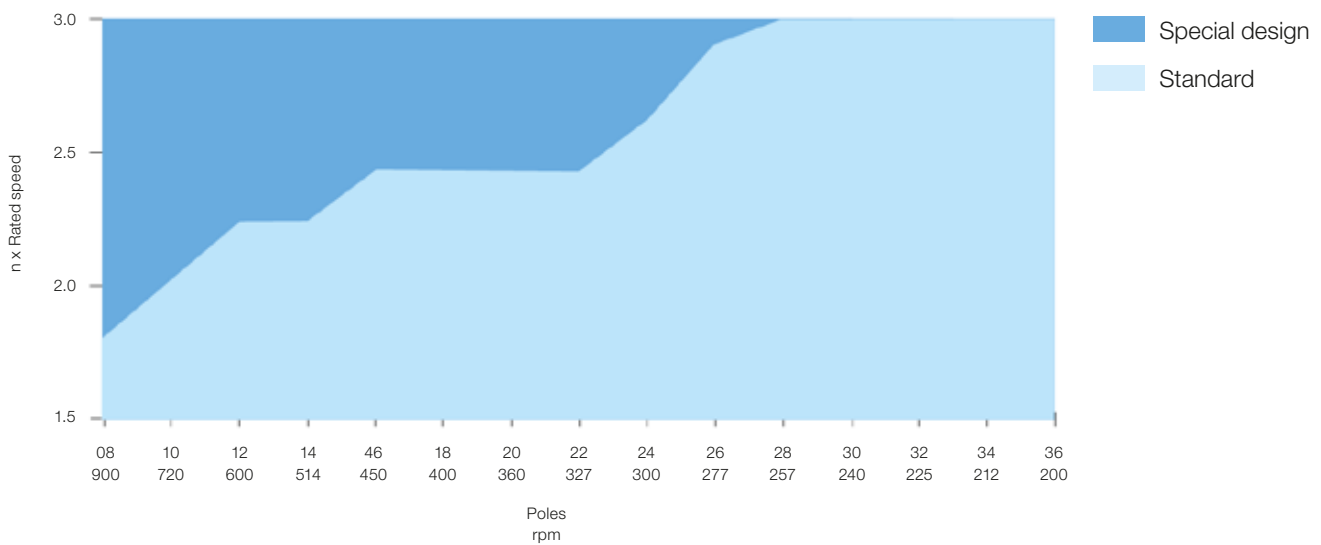


Figure 1 - Maximum speed according to rated speed



Testing Laboratories

WEG motors and generators are tested according to NBR 17094-3, IEC 60034, NEMA MG 1 or API standards in modern laboratories. Capable of testing machines with rated output up to 20,000 kVA and voltages up to 15,000 V, WEG testing laboratories have high-precision controls and fully computerized test monitoring systems. The tests are divided into three categories: routine, type and special tests. Routine tests are performed on all motors. Type and special tests can be performed upon customer request.



Technical Assistance

WEG provides its customers with technical assistance services, responsible for all after-sales support. These services include general queries attendance and field service, including diagnosis, machines commissioning and 24-hour duty (+55 47 3276-6969). WEG also provides its authorized technical assistance network, present throughout Brazil and worldwide. The technical assistance has a trained and experienced team, capable of the most several field situations and remote support, using the latest equipment, bringing reliability to the results.



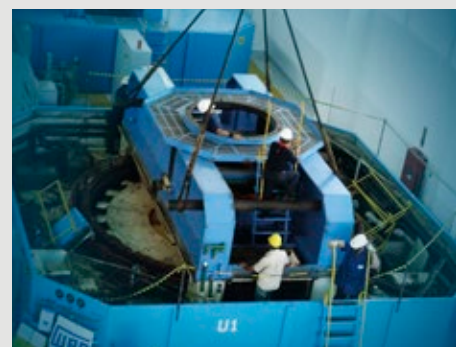
Services

To recover medium and large electric machines, count on the WEG service team. The products are overhauled and recovered using the same technology as in the new products manufacture. The services are performed in field (at the customer's own) or at the factories in Jaraguá do Sul/SC, Sertãozinho/SP and São Bernardo do Campo/SP, which are also approved for services on equipment used in explosives atmospheres. In these factories all procedures and support of engineering, industrial processes and quality control departments are available, performing services with agility and quality.

Service of **WEG products** and other brands:

- DC motors and generators
- Three-phase induction motors (squirrel-cage or slip-rings, medium and high voltage)
- Synchronous motors (with or without brushes, medium and high voltage)
- Synchronous condensers
- Turbogenerators
- Hydrogenerators
- Wind turbines
- Steam turbines
- Steam turbines

WEG Services: flexibility, agility and experience to optimize your time and productivity.



For WEG's worldwide
operations visit our website



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Cod: 50019093 | Rev: 10 | Date (m/a): 10/2022.

The values shown are subject to change without prior notice.
The information contained is reference values.