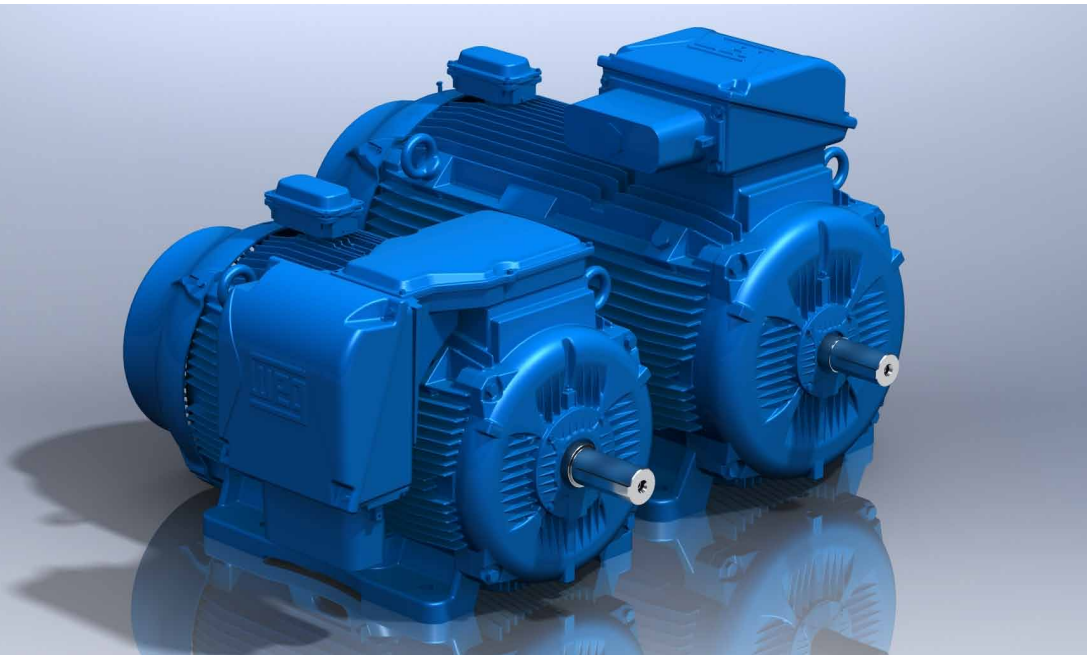
W22 High Voltage

IEC Three-Phase Electric Motors

Technical Catalogue
European Market



W22 Line – High Voltage Motors
Taking the new designed platform of W22 line for LV motors, Weg developed the W22 High Voltage Motors.

The W22 High Voltage Motors take advantage of the same achieved key objectives introduced with the LV motors line:

- Reduction noise and vibrations levels
- Increased energy efficiencies by using the same ventilation system and bearings
- Easy maintenance
- Flexible and modular design

Using electrical design optimizations software, the technical know-how in manufacturing compact pre-formed coils and making the required mechanical changings, WEG presents its new and competitive W22 High Voltage Motors Line.

W22 High Voltage Motors are available for supply voltages between 1,1kV up to 6,6kV.

W22 Three-phase electric motor series.

Designed for today. Protecting tomorrow.

Visual Index

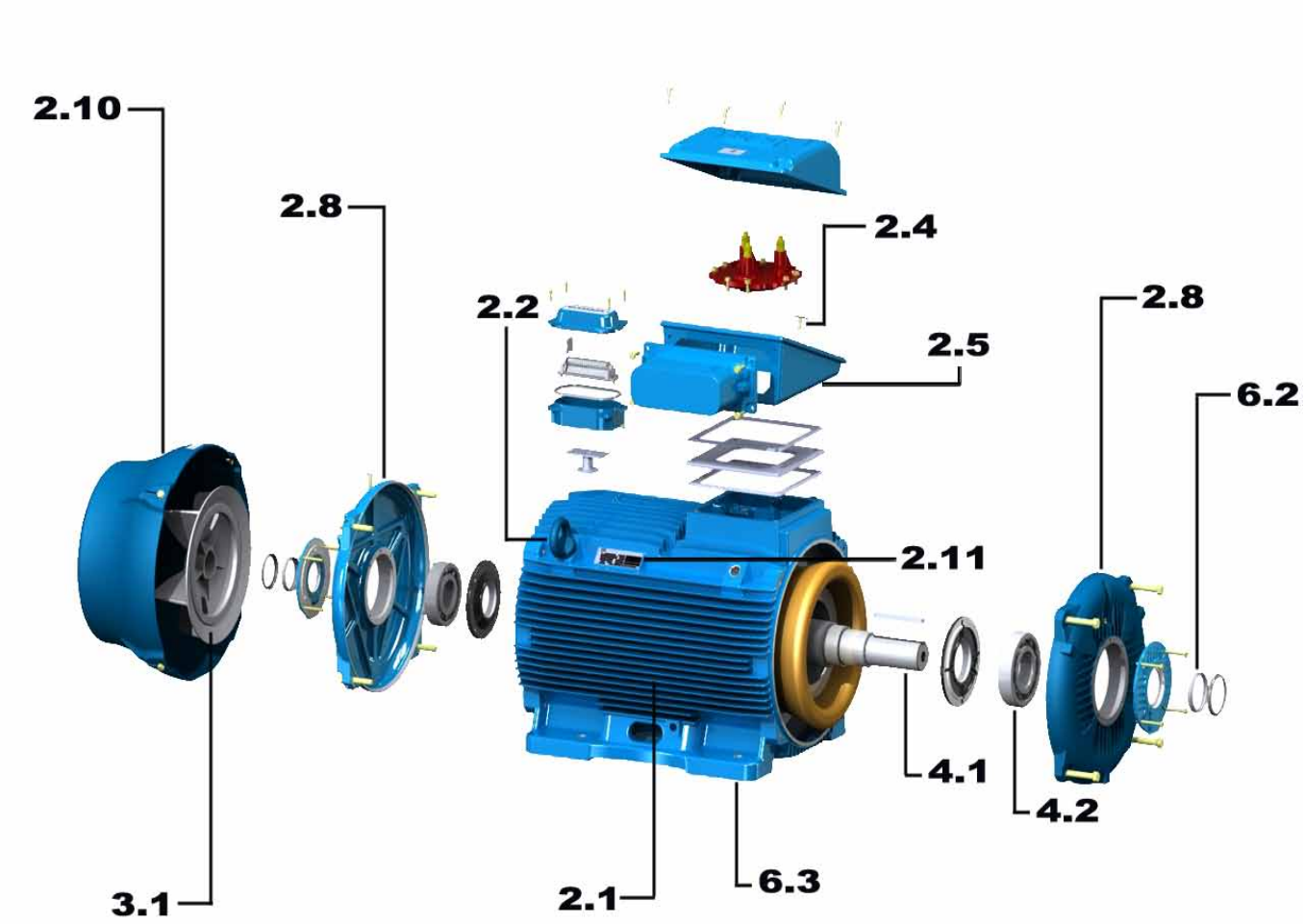


Table 1 - Visual Index

Table of Contents

1. Standards

W22 motors meet the requirements and regulations of the latest version of the following Standards:

IEC60034-1 Rotating electrical machines – Part 1: Rating and performance.
IEC60034-2-1 Rotating electrical machines – Part 2-1: Standard methods for determining losses and efficiency from tests (excluding machines for traction vehicles).
IEC60034-5 Rotating electrical machines – Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) - classification.
IEC60034-6 Rotating electrical machines – Part 6: Methods of cooling (IC code).
IEC60034-7 Rotating electrical machines – Part 7: Classification of types of enclosures and mounting arrangements (IM code).
IEC60034-8 Rotating electrical machines – Part 8: Terminal markings and direction of rotation.
IEC60034-9 Rotating electrical machines – Part 9: Noise limits.
IEC60034-11-1 Rotating electrical machines – Part 11-1: Thermal protection.
IEC60034-14 Rotating electrical machines – Part 14: Mechanical vibration of certain machines – Limits of vibration.
IEC60072-1 Dimensions and output series for rotating electrical machines – Part 1: Frame numbers 56 to 400 and flange numbers 55 to 1080.

Figure 1 – W22 Frame

The motor feet are completely solid for better mechanical strength (figure 2), allowing easier alignment and installation.

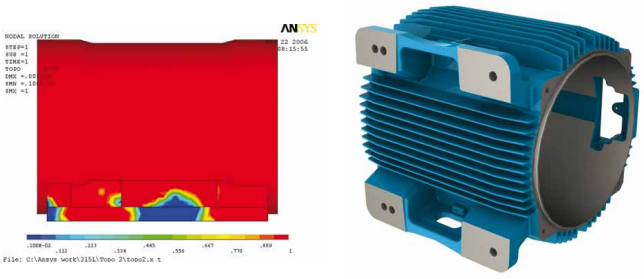


Figure 2 – Solid feet

2. Construction details

The information included in this document refers to standard construction features and the most common variations for W22 motors in high voltage for general applications in frame sizes from IEC 315L to 355A/B.
W22 motors for special and/or customised applications are available on request. For more information, please contact your WEG office or distributor.

2.1 Frame

The W22 frame (figure 1) is manufactured in FC-200 cast iron to provide high levels of mechanical strength to cater for the most critical applications. The cooling fins are designed to minimize the accumulation of liquids and dust over the motor.

2.2 Eyebolts

The position of the eyebolts in motors W22 High Voltage is shown in table 2:

Number of eyebolts	Description
2	Motors with feet and side or top mounted terminal box. These motors have four threaded holes in the upper part of the frame for fastening of the eyebolts (figure 3)
2	Motors without feet and with C or FF flange. These motors have four threaded holes in the upper part of the frame for fastening of the eyebolts and two more threaded holes in the bottom part

Table 2 - Eyebolts

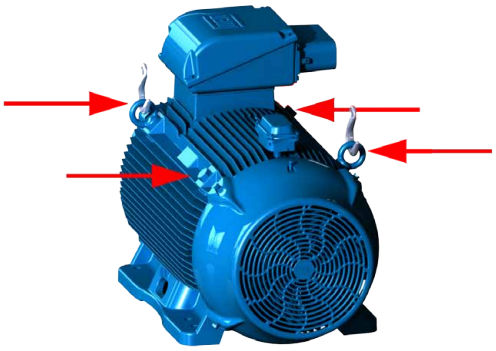


Figure 3 - Motor with four threaded holes for fastening of the eyebolts

2.3 Points for vibration monitoring

To allow easy maintenance, specifically vibration checking, the 315 and 355 frames are designed with flat areas on both ends for better placement of the accelerometer (figure 4). These areas are both available in vertical and horizontal planes. Besides areas on the frame, W22 motors count on flat areas on the endshields for easier installation of accelerometers.
As an option M8 threads for SPM accelerometers can be supplied.

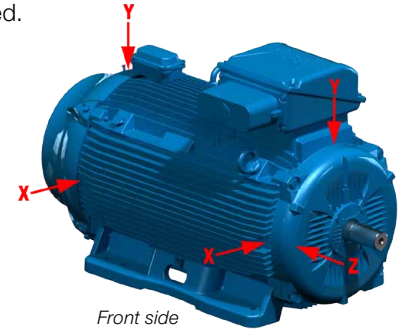


Figure 4 - Flat surfaces for vibration monitoring on the back and front side

2.4 Earth terminals

All frames are provided with one earth terminal located inside of the terminal box (see figure 5).

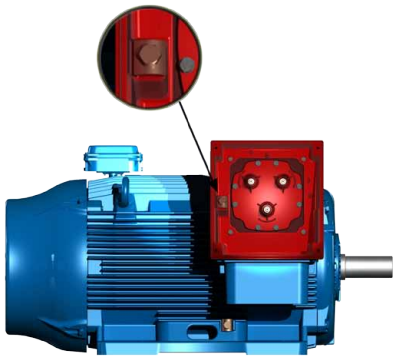


Figure 5 - Earth terminals in the terminal box

Two additional earth terminals on each side of the frame are provided to equalize electrical potential and provide greater safety for operators (figure 6).

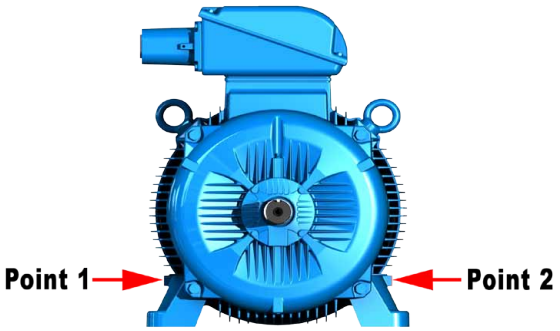


Figure 6 - Earth terminals position in the frame

2.5 Terminal box

The terminal box of W22 motors is made with FC-200 cast iron, which is the same material used to produce the frame and endshields. It is diagonally split for easier handling of leads and connections.
As standard the terminal box has a cable entrance extended gland plate that allows proper cable termination in most of high voltage cables.
As an option it is available a longer cable entrance plate and a 45º oblique one. These arrangements are shown in figures 7.1 and 7.2. A threaded hole M63 x 1,5 is provided for cable fitting of cable gland.
Also, as an option, the gland plates can be supplied undrilled.
A second terminal box, with neutral connection, is available as option.

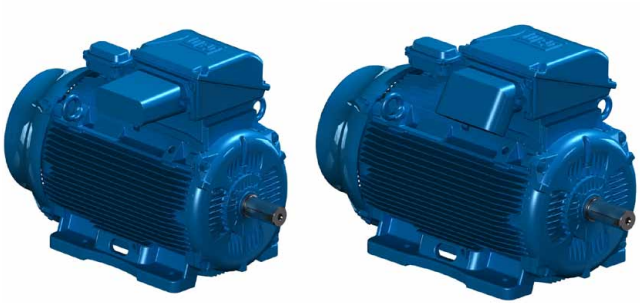


Figure 7.1 and 7.2 - Optional entrance plates

Terminal box is positioned towards the drive end of the motor and on top as standard.
This arrangement allows improvement of the airflow over the cooling fins, thus reducing motor operating temperatures.
Terminal box position on either the left or right hand side of the motor is possible through the use of an adaptor (see figure 8).

Figure 8 - Terminal box mounted on the left side viewing from shaft end

When supplied from the factory with a side mounted terminal box arrangement, this can be positioned on the opposite side simply by rotating the adaptor.
Similarly, by removing the adaptor and adjusting the length of the motor leads, the terminal box can be positioned on top of the motor.
The flexibility of terminal box positions on the W22 motor offered by the adaptor can be seen in figure 9.

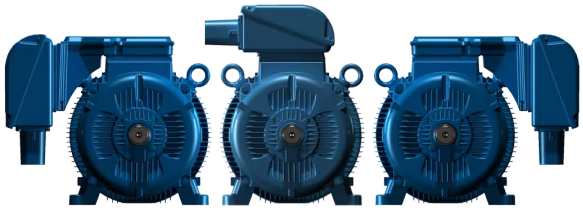


Figure 9 – Terminal box mounted on both sides and on top (versatility)

Motors are supplied with plastic threaded plugs in the cable entries to maintain the degree of protection during transport and storage.
In order to guarantee the degree of protection, cable entries must comply with at least the same degree of protection indicated on the motor nameplate. Lack of compliance with such detail can invalidate the motor warranty. If required, please contact the WEG Service Area for further advice.

2.6 Power supply connection leads

Motor power supply leads are marked in accordance with IEC 60034-8 and are connected to a terminal block made in araldite with 3 - pin size M14 (see figure 11).

Figure 11 - Three-pin terminal block

2.7 Accessory connection leads

Accessory terminals are assembled on connectors in a separate accessory terminal box (figure 12).
The motors are supplied with 1xPTC/phase (single type).
1xM20 x 1.5 threaded hole is provided for fitting of cable gland for the incoming connection leads.

Figure 12 – Accessory Terminal Box

There is also the option of providing a dedicated terminal box for the connection of space heaters or other auxiliaries as shown in figure 13.

Figure 13 – Two accessory terminal boxes

2.8 Endshields

The drive end endshield (figure 14.1) is designed with fins for better thermal heat dissipation, and to ensure low bearing operating temperatures, resulting in extended lubrication intervals.
In all these frames, where ventilation is critical for thermal performance of the motor, the endshield fastening screws are placed in such a way so as not to block airflow to any fin, thus contributing to better thermal exchange.

Figures 14.1 and 14.2 - Drive and non-drive endshields

2.9 Drains

The endshields have holes for drainage of water that may condense inside of the frame. These holes are supplied with rubber drain plugs, in accordance with figure 15.
These plugs leave the factory in the closed position and must be opened periodically to allow the exit of condensed water.

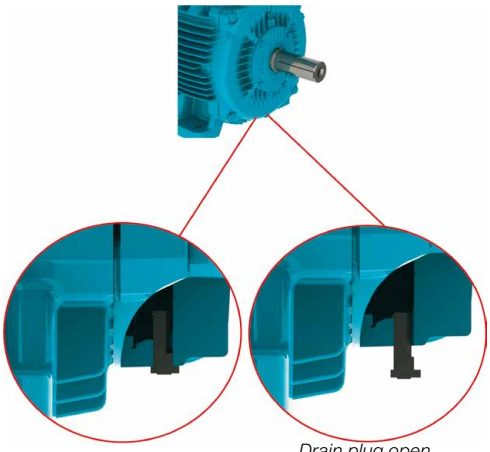


Figure 15 - Detail of the drain plug position on drive and endshield

2.10 Fan cover

The fan cover is made of FC-200 cast iron. The cast iron fan covers have an aerodynamic design, which results in a significant reduction in noise level and optimized airflow between frame fins for heat exchange improvement. Figure 16 shows the aerodynamic design of the cast iron fan cover.

Figure 16 – Fan cover

2.11 Nameplates

The main nameplate supplies information determining motor construction and performance characteristics (see figure 18). Besides main nameplate, W22 High Voltage Motors are equipped with other information nameplates as follows:

- Main terminal box indicative plate and warning plate (see figure 19)
- Auxiliary terminal box indicative plate with connection scheme for accessories (see figure 20)
- Sense of rotation nameplate - located over fan cover (see figure 21)
- Neutral terminal box indicative plate (when this optional is requested)
- 2nd auxiliary terminal box indicative plate (when this optional is requested)

Figure 17 – Nameplate position

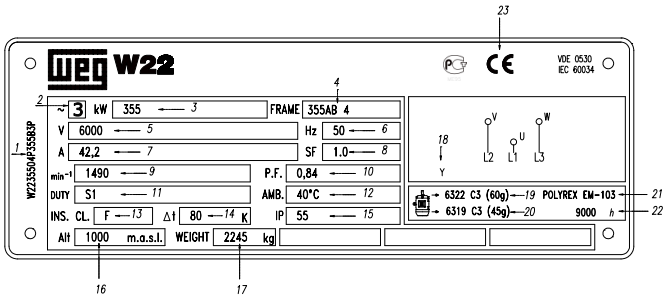


Figure 18 - Main nameplate

1 – Manufacturing Country
2 – Three phase
3 – Motor rated power
4 – Frame size
5 – Rated operating voltage
6 – Frequency
7 – Rated operating current
8 – Service factor
9 – Full load speed (rpm)
10 – Power factor
11 – Service duty
12 – Ambient temperature
13 – Insulation class
14 – Temperature rise
15 – Degree of protection
16 – Altitude
17 – Motor weight
18 – Connection diagram Y connection
19 – Non-drive end bearing specification and amount of grease
20 – Drive end bearing specification and amount of grease
21 – Type of grease for bearings
22 – Relubrication intervals in hours
23 – Certification labels

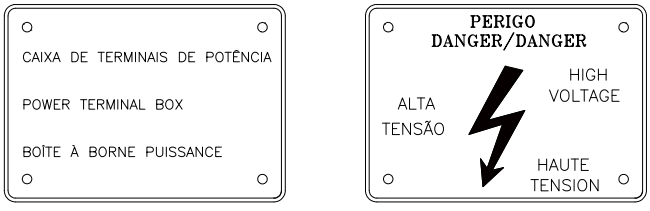


Figure 19 - Main terminal box plates

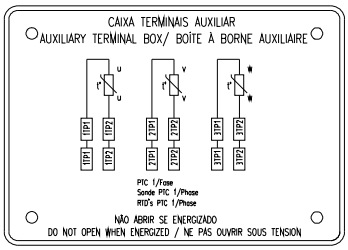


Figure 20 - Auxiliary terminal box plate

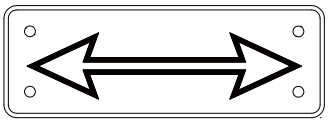


Figure 21 - Sense of rotation plate (Bidirectional)

3. Cooling system and Noise level / Vibration level / Impact resistance

3.1 Cooling system and Noise level

The W22 standard high voltage motors are totally enclosed fan cooled (IC411), as per IEC 60034-6 (figure 22). Non-ventilated versions (TENV), air over (TEAO) and with forced ventilation TEFV (IC416) are available on request.

Figure 22 – Cooling system

The cooling system (fan, non drive endshield and fan cover) is designed to minimize the noise level and improve thermal efficiency (figure 23).

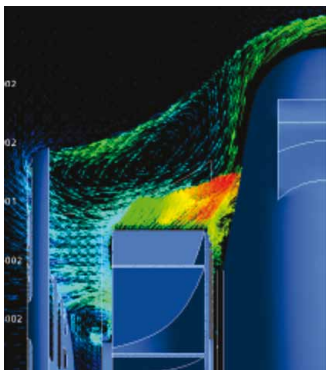


Figure 23 – Cooling system operation

W22 high voltage motors comply with IEC60034-9 Standard and the corresponding sound pressure levels. Tables 3 and 4 show sound pressure levels in dB(A) which are obtained upon tests at 50 Hz and 60 Hz.

IEC 50 HZ				
Frame	Sound pressure level - dB(A)			
	2 Poles	4 Poles	6 Poles	8 Poles
315 L	78	74	68	68
355M/L	80	76	73	70
355A/B	83	76	73	70

Table 3 – Sound pressure levels for 50 Hz motors

IEC 60 HZ				
Frame	Sound pressure level - dB(A)			
	2 Poles	4 Poles	6 Poles	8 Poles
315L	82	79	71	71
355M/L	84	81	77	75
355A/B	89	81	77	75

Table 4 – Sound pressure levels for 60 Hz motors

The noise level figures shown in tables 3 and 4 are taken at no load. Under load the IEC 60034-9 Standard foresees an increase of the sound pressure levels as shown in table 5.

Frame (mm)	2 poles	4 poles	6 poles	8 poles
H = 315	2	3	5	6
H = 355	2	2	4	5

Table 5 – Maximum expected increase of sound pressure level for loaded motors.

Note: These figures refer to operating frequencies of 50 Hz and 60 Hz.
The global noise level can be reduced up to 2 dB (A) with the installation of a drip cover.

3.2 Vibration level

Vibration of an electrical machine is closely related to its assembly on the application and, thus, it is generally desirable to perform vibration measurements under installation and operational conditions. Nevertheless, to allow evaluation of the vibration generated by the electrical machine itself in a way to allow reproducibility of the tests and the obtaining of comparative measurements, it is necessary to perform such measurements with the machine uncoupled, under controlled test conditions. The test conditions and vibration limits described here are those found in IEC 60034-14.
The severity of vibration is the maximum value of vibration found among all the recommended measurement points and directions. The table below indicates the recommended admissible values of vibration severity under IEC standard 60034-14 for the frames IEC 56 to 400, for degrees of vibration A and B.
W22 high voltage motors are dynamically balanced with half key and the standard version meets the vibration levels of Grade A (without special vibration requirements) described in IEC 60034-14 Standard. As an option, motors can be supplied in conformance with vibration of Grade B. The applicable RMS speed and vibration levels in mm/s of Grades A and B are shown in table 6.

Vibration	Frame	H > 280
	Assembly	Vibration speed RMS (mm/s)
Grade A	Free suspension	2.8
Grade B	Free suspension	1.8

Table 6 –Speed and vibration levels (acc. with IEC60034-14 Standard)

3.3 Impact resistance

The W22 motor complies with impact level IK08 – mechanical impact of 5J as per EN 50102 – Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code) ensuring superior mechanical strength for the most demanding applications.

4. Shaft / Bearings

4.1 Shaft

The shaft of W22 standard motors is made of AISI 4140 steel.
As they are fitted with AISI 4140 steel shafts in frames 315L, 355M/L and 355A/B, W22 motors can employ roller bearings, making them suitable for heavy duty applications such as pulley and belt applications. Information about maximum allowable radial and axial loads on shaft ends is given in tables 8, 9 and 10.
Important: Under such circunstances, the non drive end bearing cap needs to be replaced as the non drive end bearing must be locked.

Shafts are supplied with an open profile key way, with a threaded centre hole and have dimensions shown in section 15 – Mechanical data.
W22 high voltage motors can be supplied with a second shaft end as per dimensions shown in section 15 – Mechanical data. Information about maximum allowable radial and axial loads on the second shaft end is available on request.
As an option, W22 high voltage motors can be supplied with stainless steel shafts (AISI 316 and AISI 420) for highly corrosive environments.

4.2 Bearings

W22 high voltage motors are supplied with deep groove ball bearings as standard (figure 24). Optionally, can be supplied with NU series roller bearings, where high radial loads may occur.

Figure 24 - Bearing view

The nominal bearing life L10h is 20,000 or 40,000 hours in conformance with maximum radial and axial loads as described in tables 8, 9 and 10. When direct coupled to the load (without axial or radial thrusts), the L10h bearing life is 50,000 hours.

In standard configuration, with ball bearings, the drive end bearing is locked axially. To compensate for any axial movement the motors are fitted with pre-load springs. When provided with roller bearings, the rear bearing is locked and the axial movement is compensated by the axial play of the front roller bearing. Maximum admissible radial loads for roller bearings are shown in table 9 on page 11.
Bearings lifetime depends on the type and size of the bearing, the radial and axial mechanical loads it is submitted to, operating conditions (environment, temperature), rotational speed and grease life. Therefore, bearing lifetime is closely related to its correct use, maintenance and lubrication. Respecting the quantity of grease and lubrication intervals allows bearings to reach the lifetime given. W22 high voltage motors are provided as standard with grease fittings in each endshield to permit the relubrication of the bearings. The quantity of grease and lubrication intervals are stamped in the motor nameplate. The lubrication interval is shown in tables 11 and 12 - page 12.
It must be emphasized that excessive lubrication, i.e. a quantity of grease greater than that recommended on the motor nameplate, can result in the increase of bearing temperatures leading to reduced operating hours.

Note:
L10h lifetime means that at least 90% of the bearings submitted to the maximum indicated loads will reach the number of hours indicated. The maximum admissible radial and axial loads for the standard configuration are shown in table 8, 9 and 10. The values of the maximum radial load consider axial load as nil. The values of the maximum axial load consider radial load as nil. For bearing lifetime in combined axial and radial loads condition contact WEG.

The radial force value Fr usually results from information recommended on catalogues of pulley/belts manufacturers. When this information is not available, the force Fr, under operation, can be calculated based on the output power, on coupling design characteristics with pulleys and belts and on the type of application. So we have:

$$Fr = \frac{19{,}1 \cdot 10^6 \cdot P_n}{n_n \cdot dp} .ka \quad (N)$$

Where:
Fr is the radial force caused by pulley and belt coupling [N];
Pn is the motor rated power [kW];
n_n is the motor rated speed per minute [rpm];
dp is the pitch diameter of the driven pulley [mm];
ka is a factor that depends on belt tension and type of application (table 7).

	Groups and Basic Types of Application	ka Factor of the application	
		V-Belts	Plane Belts
1	(Fans and Blowers. Centrifugal Pumps. Winding machines. Compressors. Machine tools) with outputs up to 30 HP (22 kW)	2.0	3.1
2	(Fans and Blowers, Centrifugal Pumps, Winding machines, Compressors, Machine tools) with outputs higher than 30 HP (22 kW), Mixers, Plungers, Printer Machines.	2.4	3.3
3	Presses, vibrating screens, Piston and screw compressor, pulverisers, helicoidal conveyors, woodworking machines, Textile machines, Kneading machines, Ceramic machines, Pulp and paper industrial grinders.	2.7	3.4
4	Overhead cranes, Hammer mills, Metal laminators, Conveyors, Gyratory Crushers, Jaw Crusher, Cone Crushers, Cage Mills, Ball Mills, Rubber Mixers, Mining machines, Shredders.	3.0	3.7

Table 7 – ka factor

Important:
1 - Special applications
Motor operation under adverse operating conditions, such as higher ambient temperatures and altitudes or abnormal axial / radial loads, may require specific lubrication measures and alternative relubrication intervals to those indicated in the tables provided within this technical catalogue.

2 - Roller bearings
Roller bearings require a minimum radial load so as to ensure correct operation. They are not recommended for direct coupling arrangements, or for use on 2 pole motors.

3 - Motors with modified mounting configurations
For motors supplied with horizontal mounting but working vertically, lubrication intervals must be reduced by half.

4 - Figures for radial thrusts
The figures given in the tables below for radial thrusts take into consideration the point upon which the load is applied, either at the centre of the shaft (L/2) or at the end of the shaft (L), figure 25.

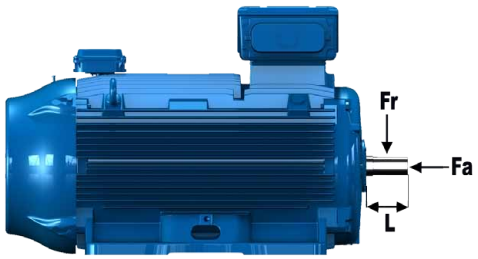


Figure 25 - Radial and axial thrust on motor shaft

4.2.1 Permissible thrust

Radial thrust - Ball bearings

Maximum permissible radial thrust - 50 Hz – Fr in (kN) 20,000 hours								
Frame	2 poles		4 poles		6 poles		8 poles	
	L	L/2	L	L/2	L	L/2	L	L/2
315L	4.6	5.0	4.0	7.3	6.2	8.2	9.1	9.8
355M/L	4.8	5.1	8.5	9.3	9.6	10.4	11.6	12.6
355A/B	4.5	4.7	5.1	7.4	7.4	8.0	6.9	10.6

Table 8.1 – Maximum permissible radial thrusts for ball bearings

Radial thrust - Ball bearings

Maximum permissible radial thrust - 50 Hz – Fr in (kN) 40,000 hours								
Frame	2 poles		4 poles		6 poles		8 poles	
	L	L/2	L	L/2	L	L/2	L	L/2
315L	3.4	3.6	4.0	4.9	5.1	5.5	6.4	6.9
355M/L	3.3	3.6	5.8	6.3	6.5	7.1	8.2	8.9
355A/B	3.0	3.2	4.1	4.4	4.2	4.5	5.3	6.8

Table 8.2 – Maximum permissible radial thrusts for ball bearings

Radial thrust - Roller bearings

Maximum permissible radial thrust - 50 Hz - Fr in (kN) 20,000 or 40,000 hours						
Frame	4 poles		6 poles		8 poles	
	L	L/2	L	L/2	L	L/2
315L	4	8.5	6.2	13.3	10.4	22.6
355M/L	15	31.7	13.7	28.9	14.3	30.1
355A/B	5.1	10.7	7.8	16.4	6.9	14.6

Table 9 – Maximum permissible radial thrusts for roller bearings
Note: the figures given for roller bearings take into consideration shaft supplied with steel AISI 4140

Axial thrust - Ball bearings

Maximum permissible axial thrust - 50 Hz - Fa in (kN) - 20,000 hours							
Frame	Poles	Horizontal		Vertical with shaft upwards		Vertical with shaft downwards	
		Pushing	Pulling	Pushing	Pulling	Pushing	Pulling
315L	2	3.0	2.2	1.1	5.0	5.7	0.4
	4	4.5	3.7	1.4	8.2	8.9	0.6
	6	5.2	4.4	1.9	9.5	10.3	1.2
	8	6.3	5.5	3.4	10.0	10.8	2.6
355M/L	2	4.4	3.7	1.1	8.8	9.5	0.3
	4	7.7	7.0	3.2	13.9	14.7	2.5
	6	9.1	8.4	4.7	15.3	16.0	3.9
	8	10.9	10.2	6.4	17.2	17.9	5.7
355A/B	2	4.1	3.3	On request			
	4	6.8	6.0				
	6	7.8	7.0				
	8	9.8	9.0				

Table 10.1 – Maximum permissible axial thrusts for ball bearings

Axial thrust - Ball bearings

Maximum permissible axial thrust - 50 Hz - Fa in (kN) - 40,000 hours							
Frame	Poles	Horizontal		Vertical with shaft upwards		Vertical with shaft downwards	
		Pushing	Pulling	Pushing	Pulling	Pushing	Pulling
315L	2	3.0	2.2	1.1	5.0	5.7	0.4
	4	4.5	3.7	1.4	8.2	8.9	0.6
	6	5.2	4.4	1.9	9.5	10.3	1.2
	8	6.3	5.5	3.4	10.0	10.8	2.6
355M/L	2	3.1	2.4	0.6	6.7	7.5	0.2
	4	5.5	4.7	1.9	1.1	11.6	1.2
	6	6.3	5.6	2.8	11.8	12.7	2.0
	8	7.6	6.8	3.8	13.2	13.7	2.9
355A/B	2	2.9	2.2	On request			
	4	4.6	3.9				
	6	5.2	4.5				
	8	6.5	5.8				

Table 10.2 – Maximum permissible axial thrusts for ball bearings

Lubrication intervals

Lubrication intervals (hours)				
Frame	Poles	Bearing	50 Hz	60 Hz
315	2	6314	5,000	4,000
	4	6319	11,000	8,000
	6		16,000	13,000
	8		20,000	17,000
355	2	6314	5,000	4,000
		6316	4,000	On request
	4	6322	9,000	6,000
	6		13,000	11,000
	8		19,000	14,000

Table 11 – Lubrication intervals for ball bearings
Note: the amount of grease is indicated on the nameplate

Lubrication intervals (hours)				
Frame	Poles	Bearing	50 Hz	60 Hz
315	4	NU319	7,000	5,000
	6		12,000	9,000
	8		17,000	15,000
355	4	NU322	5,000	4,000
	6		9,000	7,000
	8		14,000	13,000

Table 12 – Lubrication intervals for roller bearings
Note: the amount of grease is indicated on the nameplate

4.2.2 Bearing monitoring

W22 high voltage motors can be equipped with bearing temperature detectors for monitoring bearing operating conditions. Usually a Pt100 temperature detector for continuous monitoring of bearing operating temperature is used.
This type of monitoring is extremely important considering that it directly affects the grese and bearing lives particulary on motors equipped with greasing facilities.

5. Mounting forms

Motors are supplied, as standard, in the B3T configuration, with the terminal box on top.

Figure 26 – B3T mounting

The mounting configuration for the W22 high voltage motor lines comply with IEC standard 60034-7. Standard mounting forms and their variations are shown in table 13. After the designation, a characteristic letter is used to define the terminal box position. So, the mounting code IM B3 can be seen in WEG documents as detailed below (without IM code).
B3L – terminal box on left hand side of the motor frame
B3T – terminal box on top of the motor frame
B3R – terminal box on right hand side of the motor frame

Note: The terminal box position is defined viewing the motor from the shaft end (figure 26).

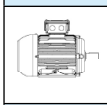
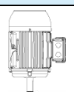
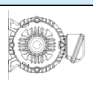
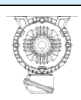
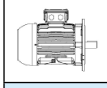
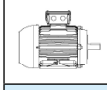
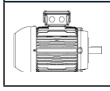
Basic mountings	Other type of mounting				
IM B3	IM V5	IM V6	IM B6	IM B7	IM B8
IM 1001	IM 1011	IM 1031	IM 1051	IM 1061	IM 1071
					
IM B35	IM V15	IM V36	- *)	- *)	- *)
IM 2001	IM 2011	IM 2031	IM 2051	IM 2061	IM 2071
					
IM B34	IM V17	IM V37	- *)	- *)	- *)
IM 2101	IM 2111	IM 2131	IM 2151	IM 2161	IM 2171
					
IM B5	IM V1	IM V3			
IM 3001	IM 3011	IM 3031			
					
IM B14	IM V18	IM V19			
IM 3601	IM 3611	IM 3631			
					

Table 13 – Mountings configurations

** Non-defined mountings by IEC 60034-7*

Important:

1. For motors mounted vertically shaft down fitting of a drip cover is recommended to prevent ingress of small objects into the fan cover. The increase in total length of the motor with drip cover is shown in the section 17.
2. For vertically shaft up mounted motors installed in environments containing liquids, the use of a rubber slinger is recommended to prevent the ingress of liquid into the motor through the shaft.

6. Degree of protection / Sealing system / Painting

6.1 Degree of protection

As per IEC 60034-5 Standard, the degree of protection of a rotating electrical machine consists of the letters IP (ingress protection), followed by two characteristic numerals, with the following meaning:

a) First characteristic numeral: referred to protection of people against or approach to live parts and against contacts with moving parts (other than smooth rotating shafts and the like) inside the enclosure and protection of the machine against ingress of solid and foreign objects.

b) Second characteristic numeral: protection of machines against harmful effects due to ingress of water.

W22 high voltage motors are supplied with degrees of protection in conformance with IEC 60034-5. As standard, they are IP55, wich means:

a) First characteristic numeral 5: machine protected against dust. The enclosure is protected against contact with moving parts. Ingress of dust is not totally prevented, but dust does not enter in sufficient quantity to interfere with satisfactory operation of the machine.

b) Second characteristic numeral 5: Machine protected against water jets. Water projected by a nozzle against the machine from any direction shall have no harmful effect.

6.2 Sealing system

The sealing system applied to the shaft of W22 high voltage motors is the exclusive WSeal®, which consists of a double lipped V'Ring with a metallic cap (see figure 27). This configuration operates like a labyrinth preventing ingress of water and dust into the motor.

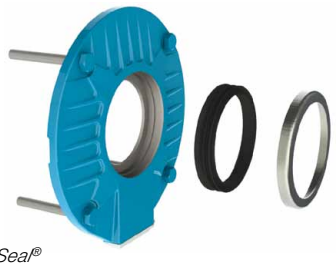


Figure 27 – WSeal®

Alternatively, W22 high voltage motors can be supplied with other sealing systems, for example, oilseal, tachonite labyrinth and the WEG exclusive W3Seal®, among others (see section 13 – Optional features).
When fitted with flange, the recommended seal is lip seal (no contact with liquid) and oilseal (with contact with liquid).

6.3 Painting

Figure 28 – WEG internal painting plan

W22 high voltage motors are supplied as standard with WEG internal painting plan 203A, consisting of:

- Primer: one coat with 20 to 55 µm of alkyd primer;
- Finishing: one coat with 30 to 40 µm of alkyd synthetic enamel.

This painting plan has a minimum resistance to the salt spray test of 240 hours in accordance with ASTM B 117/03 and may be used in motors applied in normal environments, slightly severe, sheltered or non-sheltered, for industrial use, with low relative humidity, normal temperature variations and the presence of SO_2.

Note:
This painting plan is not recommended for direct exposure to acid steam, alkalis, solvents and salty environments.
Alternative painting plans are available on request, which are suitable to guarantee additional protection in aggressive environments, either protected or unprotected (see section 13 – Optional features).

6.4 Tropicalized painting

The integrity of the insulation system is the primary consideration when determining the lifetime of an electric motor. High humidity can result in premature deterioration of the insulation system, therefore for any ambient temperature with relative humidity above 95%, it is recommended to coat all internal components of the motor with an epoxy painting, also known as tropicalization.
W22 High Voltage Motors receive as standard a tropicalized painting.

7. Voltage / Frequency

In IEC 60034-1 the combination of voltage and frequency variations are classified as Zone A or Zone B, as per figure 29.

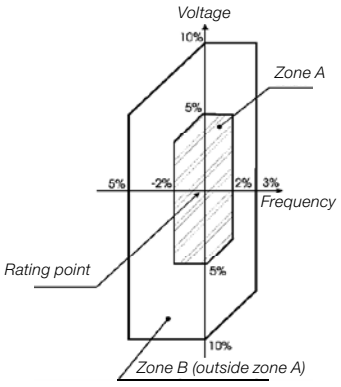


Figure 29 - Rated voltage and frequency limits for electric motors

IEC 60034-1 states that the motor must be suitable to perform its main function (supply torque) continuously at Zone A. However, this motor may not fully meet its performance characteristics due to power supply voltage and frequency variation, which can result in temperature rise above the rated value.

The motor must also be suitable to perform its main function (supply torque) at Zone B. However, the performance characteristic changes will be greater than those operating at Zone A. The temperature rise will also be higher than that of rated voltage and frequency and that operating at Zone A. Prolonged operation near Zone B boundary is not recommended.

8. Overload capacity

As per IEC 60034-1, motors with output power up to 315 kW are suitable for an overload 1.5 times the rated torque for 2 minutes.

9. Ambient / Insulation

Unless otherwise specified, the rated power outputs shown in the electrical data tables within this catalogue refer to continuous duty operation S1, as per IEC 60034-1 and under the following conditions:

- With ambient temperature range -20°C to +40°C
- With altitudes up to 1000 metres above sea level

For operating temperatures and altitudes differing from those above, the factors indicated in table 14 must be applied to the nominal motor power rating in order to determine the derated available output (Pmax).

Pmax = Pnom x correction factor

T (°C)	Altitude (m)								
	1000	1500	2000	2500	3000	3500	4000	4500	5000
10							0.97	0.92	0.88
15						0.98	0.94	0.90	0.86
20					1.00	0.95	0.91	0.87	0.83
25				1.00	0.95	0.93	0.89	0.85	0.81
30			1.00	0.96	0.92	0.90	0.86	0.82	0.78
35		1.00	0.95	0.93	0.90	0.88	0.84	0.80	0.75
40	1.00	0.97	0.94	0.90	0.86	0.82	0.80	0.76	0.71
45	0.95	0.92	0.90	0.88	0.85	0.81	0.78	0.74	0.69
50	0.92	0.90	0.87	0.85	0.82	0.80	0.77	0.72	0.67
55	0.88	0.85	0.83	0.81	0.78	0.76	0.73	0.70	0.65
60	0.83	0.82	0.80	0.77	0.75	0.73	0.70	0.67	0.62
65	0.79	0.76	0.74	0.72	0.70	0.68	0.66	0.62	0.58
70	0.74	0.71	0.69	0.67	0.66	0.64	0.62	0.58	0.53
75	0.70	0.68	0.66	0.64	0.62	0.60	0.58	0.53	0.49
80	0.65	0.64	0.62	0.60	0.58	0.56	0.55	0.48	0.44

Table 14 – Correction factors for altitude and ambient temperature

W22 motors are supplied with class F insulation and Class B (80 K) temperature rise at normal operating conditions (unless otherwise specified).
The difference between the temperature rise of the class F insulation (105 K) and the temperature rise of the design (80 K) means that, in practice, W22 motors are suitable to supply output ratings above the rated values up to a limit where the temperature rise reaches the temperature rise value of the insulation class.
The ratio between temperature rise and service factor is given by the equation below:

$$\Delta T_{FINAL} \approx (F.S.)^2 \times \Delta T_{INITIAL}$$

Upon service factor calculation, we can see that SF is approximately 1.15. This reserve of temperature also allows W22 motors with class B temperature rise (80 K) to operate continuously at:

- Up to 15% above its rated output power, considering 40°C ambient temperature and 1.000 m.a.s.l.
- Up to 55°C ambient temperature, keeping the rated output power
- Up to 3000 m.a.s.l., keeping the rated output power

Note: Please note that under these conditions combined ambient and temperature rise motors will reach class F limits.

Bearing lubrication intervals will change under operating conditions other than 40°C maximum ambient temperature and 1000 meters above sea level. Contact WEG for more information.

W22 High Voltage Motors insulation system consists mainly in:

- Rectangular bare copper wire with 2 or 3 mica tapes (used in respect of the applied voltage)
- Coil main insulation with mica tapes
- Straight part of coil with conductive tape for voltages above 4160V
- Coil heads mechanical protection with polyester shrinking tape
- VPI system with polyesterimide resin of class H type

9.1 Space heaters

The use of space heaters are recommended in two situations:

- Motors installed in environments with relative air humidity up to 95%, in which the motor may remain idle for periods greater than 24 hours;
- Motors installed in environments with relative air humidity greater than 95%, regardless of the operating schedule. It should be highligthed that in this situation it is strongly recommended that an epoxy paint known as tropicalized painting is applied in the internal components of the motor. More information can be obtained in section 6.4.

As an option W22 high voltage motors can be equipped with tubular space heaters of 230V. Other voltages can be also supplied as request.

The power rating and number of space heaters when fitted are indicated in table 15:

Frame	Quantities	Rated power per heater (W)
315L	2	70
355M/L 355A/B	2	87

Table 15 – Power and quantity of space heaters

10. Variable Speed Drive

10.1 Consideration regarding rated voltage

By request W22 high voltage motors can be supplied for inverter use with a rated voltage up to and included of 4160V. The limits to high voltage W22 motors are shown in the table 16, which demonstrates DOL and VSD driven (with reinforced insulation) capabilities.

Motor rated voltage	Source Type	Coil insulation (phase to phase)		Main insulation (phase to ground)	
		Peak voltage on motor terminals	dV/dt (*) on motor terminals	Peak voltage on motor terminals	dV/dt (*) on motor terminals
1100V ≤ V_{NOM} ≤ 4160V	Power Grid	≤ 5900V	≤ 500 V/µs	≤ 3400V	≤ 500 V/µs
	PWM (**)	≤ 9300V	≤ 2700 V/µs	≤ 5400V	≤ 2700 V/µs

Table 16 – High voltage limits

(*) Definition according to NEMA MG1 - Part 30
(**) Reinforced insulation for VSD operating

Notes:

1. The switching frequency must be limited to 5kHz. Switching frequencies above that accelerate the winding aging process and potentially damage the bearings.

2. If one of the above conditions is not followed accordingly (including the switching frequency), filter must be installed on VSD outlet.

3. It should be noticed that standard W22 high voltage motors do not comply with VSD supply.

10.2 Torque restrictions on variable speed drive applications

Self-ventilated variable speed drive motors have their torque limited at low frequencies due to the reduction in ventilation. Curves and derating tables must be applied to define the torque available (figure 30 / table 17).

Constant flux condition

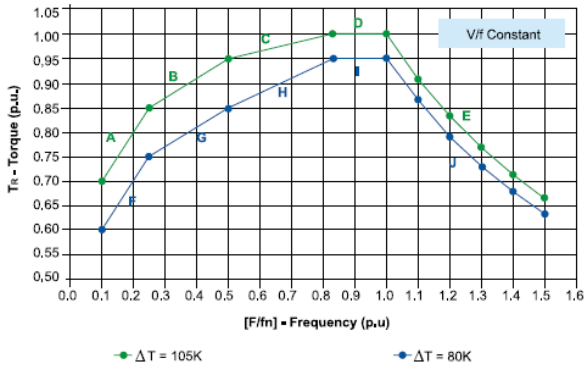


Figure 30 – Derating curve for constant flux

Derating factor with temperature rise for the insulation class*		
Interval	**Limited by**	**Apply this equation**
A	0.10 ≤ f/fn < 0.25	TR = (f/fn) + 0.60
B	0.25 ≤ f/fn < 0.50	TR = 0.40(f/fn) + 0.75
C	0.50 ≤ f/fn < 0.83	TR = 0.15(f/fn) + 0.87
D	0.83 ≤ f/fn ≤ 1.0	TR = 1.0
E	f/fn > 1.0	TR = 1/(f/fn)

Derating factor to maintain temperature rise at sinusoidal source**		
Interval	Limited by	Apply this equation
F	0.10 ≤ f/fn < 0.25	TR = (f/fn) + 0.50
G	0.25 ≤ f/fn < 0.50	TR = 0.40(f/fn) + 0.65
H	0.50 ≤ f/fn < 0.83	TR = 0.30(f/fn) + 0.70
I	0.83 ≤ f/fn ≤ 1.0	TR = 0.95
J	f/fn > 1.0	TR = 0.95/(f/fn)

Table 17 – Equation for torque definition at constant torque condition

(*) When the top curve is used (green), motor temperature rise will be limited by the temperature class of the insulation material. For example, for class F insulation motors, the temperature rise will be limited at 105 K. This curve can only be used for class F insulation and class B temperature rise motors in order to ensure that, when driven by a frequency drive, the temperature rise remains class F (above 80 and below 105 K).

(**) When the lower curve is used (blue), the motor temperature rise of the variable frequency drive will be the same driven by sinusoidal source. In other words, class F insulation motors with class B temperature rise will remain with class B temperature rise(≤ 80 K) even when driven by a variable frequency drive.

Note: *The derating curves given in figure 30 are related to the temperature on motor winding and thermal class. These curves do not foresee thermal tolerance factor of the motors. They are intended to show the torque limitations for variable frequency drive motors.*

10.3 Bearing insulation

When VSD purpose motors are supplied the NDE bearing will be of insulated type and there will be a ground system between the shaft and frame on DE side. In alternative, by customer requested, the NDE insulated bearing can be replaced by an insulated NDE endshield.

10.4 Mechanical speed

As a general rule W22 high voltage motors VSD driven can operate up to 120% of synchronous speed.
For different speed ranges a specific inquiry shall be sent to WEG.

11. Tolerances for electrical data

The following tolerances are allowed in accordance with IEC 60034-1:

Efficiency (η)	-0.15 (1-η) for Pnom ≤ 150 kW / -0.1 (1-η) for Pnom > 150 kW Where η is a decimal number
Power factor	$-\frac{1 - \cos \varnothing}{6}$ Minimum 0.02 and Maximum 0.07
Slip	± 20% for Pnom ≥ 1 kW and ± 30 % for Pnom < 1 kW
Starting current	20% (without lower limit)
Starting torque	- 15% + 25%
Breakdown torque	- 10 %
Moment of inertia	± 10 %

Table 18 - Tolerances for electrical data

12. Standard Features

IEC FRAME			315L	355M/L	355A/B
MECHANICAL FEATURES					
Nameplate marking			CE		
Mounting			B3T		
Frame	Material		Cast Iron FC-200		
Degree of protection			IP55		
Grounding			Double grounding + additional (Inside terminal box)		
Cooling method			Tottaly enclosed fan cooled - IC411		
Fan	Material	2P	Polypropylene		Aluminium
		4 - 8P	Aluminium		
Fan Cover	Material		Cast iron FC-200 for anti-fricton bearings without forced ventilation kit/steel for sleeve bearing and anti-friction bearings with forced ventilation kit		
Endshields	Material		Cast Iron FC-200		
Drain hole			Fitted with rubber frain plug		
Bearings	Clearance D.E.		C3		
	Clearance N.D.E.		C3		
	Locating bearing configuration		DE bearing locked with inner and outer bearing caps and fitted with pre-load springs in the NDE bearing		
	Drive End	2P	6314	6316	6316
		4 - 8P	6319	6322	6322
	Non-Drive end	2P	6314	6314	6314
		4 - 8P	6316	6319	6319
Bearing Seal			Wseal		
Joint Seal			Without		
Lubrification	Type of grease		Polyrex EM 103 (Exxon Mobile)		
	Grease fitting		With grease fittings in DE and NDE bearings		
Terminal Block			With terminal block - 3 pins		
Terminal Box	Material		Cast Iron FC-200		
Accessory Terminal Box			With accessory terminal box		
Leads inlet	Main Terminal box	Thread size	1 x M63 x 1,5 (removable gland plate)		
	Auxilliary Terminal box	Thread size	1 x M20 x 1,5		
	Plug		Plastic plug		
Shaft	Material		AISI 4140		
	Threaded hole	2P	M20	M20	M20
		4 - 8P		M24	M24
Vibration			Grade A		
Balance			With half key		
Nameplate	Material		Stainless steel AISI 304		
Painting	Plan		203A		
	Colour		RAL 5007		
ELECTRICAL FEATURES					
Voltage			1100 V to 6600 V		
Winding	Material		Copper		
	Impregnation		VPI		
	Insulation class		F (DT 80K / 105K)		
Service factor			1.00		
Rotor			Aluminium die cast		
Thermal protection			PTC, 1 per phase (single type)		

13. Optional Features

IEC FRAME	315L	355M/L	355A/B
MECHANICAL OPTIONALS			
Terminal box			
2nd Auxiliary terminal box	O	O	O
Terminal box with removable base	S	S	S
Gland plate	O	O	O
Terminal block			
Terminal block - three-pin	S	S	S
Terminal block - six-pin	O	O	O
Cable glands			
Plastic cable gland	O	O	O
Brass cable gland	O	O	O
Stainless steel cable gland	O	O	O
Flange			
Flange FF	O	O	O
Flange FF (Superior)	O	NA	NA
Flange FF (Inferior)	O	O	NA
Flange C-DIN	NA	NA	NA
Flange C-DIN (Superior)	NA	NA	NA
Flange C-DIN (Inferior)	NA	NA	NA
Flange C	O	O	NA
Flange C (Superior)	NA	NA	NA
Flange C (Inferior)	O	O	NA
Fan			
Polypropylene (2 and 4 poles)	S	S	NA
Polypropylene (6 and 8 poles)	NA	NA	NA
Conductive plastic	NA	NA	NA
Aluminium (2 and 4 poles)	O	O	S
Aluminium (6 and 8 poles)	S	S	S
Cast iron	O	O	O
Bearing			
Ball bearing (D.E)	S	S	S
Roller bearing (D.E)	O	O	O
Ball bearing (N.D.E)	S	S	S
Insulated drive end bearing	O	O	O
Insulated non drive end bearing	O	O	O
Bearing cap			
Without bearing cap	NA	NA	NA
With bearing cap	S	S	S
Bearing sealing			
Nitrillic rubber lip seal	NA	NA	NA
Nitrillic rubber oil seal	NA	NA	NA
Nitrillic oil seal with stainless steel spring	NA	NA	NA
Nitrillic rubber oil seal double lip	NA	NA	NA
Viton seal	O	O	O
Viton oil seal	O	O	O
Viton oil seal with stainless steel spring	O	O	O
Labyrinth Tachonite	O	O	O
W3Seal®	O	O	O

S (Standard)
O (Optional)
NA (Not available)

IEC FRAME	315L	355M/L	355A/B
MECHANICAL OPTIONALS			
Sleeve Bearings			
Axial float	6mm		
Locating bearing configuration	On DE side		
Drive end type	Under request		
Non-drive end type			
Shaft			
AISI 1040/45	NA	NA	NA
AISI 4140	S	S	S
AISI 304 (stainless steel)	O	O	O
AISI 316 (stainless steel)	O	O	O
AISI 420 (stainless steel)	O	O	O
Locking shaft device (standard for roller bearing motors)	O	O	O
Second shaft end	O	O	O
Tapped center hole	S	S	S
Degree of protection			
IP56	O	O	O
IP65	O	O	O
IP66	O	O	O
Painting plan			
202E Primer: One coat with 20 to 55 µm of alkyd oxide red Intermediate: One coat with 20 to 30 µm of isocyanate epoxy paint Finishing: One coat with 100 to 140 µm of epoxy paint N2628 Recommended for pulp and paper, mining and chemical industries	O	O	O
202P Primer: One coat with 20 to 55 µm of alkyd oxide red Intermediate: One coat with 20 to 30 µm of isocyanate epoxy paint Finishing: One coat with 70 to 100 µm of polyurethane paint N2677 Recommended for food processing industries.	O	O	O
211E Primer: One coat with 100 to 140 µm of epoxy paint N2630. Finishing: One coat with 100 to 140 µm of epoxy paint N2628 Recommended for motors supplied to Petrobras and its suppliers, to be used in refineries such as petrochemical industries that follow Petrobras specifications Note: Meets Petrobras N 1735 Standard (condition 3)	O	O	O
211P Primer: One coat with 100 to 140 µm of epoxy paint N2630 Finishing: One coat with 70 to 100 µm of PU paint N2677 Recommended for motors supplied to Petrobras and its suppliers, to be used in refineries such as petrochemical industries that follow Petrobras specifications Note: Meets Petrobras N 1735 Standard (condition 3)	O	O	O

IEC FRAME	315L	355M/L	355A/B
MECHANICAL OPTIONALS			
212E Primer: One coat with 75 to 105 µm of epoxy paint N1277 Intermediate: One coat with 100 to 140 µm of epoxy paint N2630 Finishing: One coat with 100 to 140 µm of epoxy paint N2628 Recommended for applications in pulp and paper, mining, chemical and petrochemical industries Not: Meets Petrobras N 1735 Standard (condition 4)	O	O	O
212P Primer: One coat with 75 to 105 µm of epoxy paint N1277 Intermediate: One coat with 100 to 140 µm of epoxy paint N2630 Finishing: One coat with 70 to 100 µm of PU paint N2677 Recommended for applications in pulp and paper, mining, chemical and petrochemical industries Note: Meets Petrobras N 1735 Standard (condition 4)	O	O	O
213E Primer: One coat with 75 to 90 µm of Silicate Ethyl paint N1661 Intermediate: One coat with 35 to 50 µm of epoxy paint N1202 Finishing: One coat with 240 to 340 µm of epoxy paint N2628 Recommended for off-shore oil platform Note: Meets Petrobras N 1374 Standard (condition 5.2)	O	O	O
Internal epoxy painting (Tropicalisation)	S	S	S
Lubrication			
Polyrex® EM 103 (Exxon Mobil)	S	S	S
Aeroshell 7	O	O	O
Isoflex NBU-15	O	O	O
Grease nipple			
Carbon steel grease nipple	S	S	S
Stainless steel grease nipple	O	O	O
Balance			
Balance with half key	S	S	S
Balance with full key	O	O	O
Vibration			
Grade A	S	S	S
Grade B	O	O	O
Provision for vibration detector SPM (1 x hole M8 on D.E. and N.D.E. shield for vertical reading)	O	O	O

S (Standard)
O (Optional)
NA (Not available)

IEC FRAME	315L	355M/L	355 A/B
MECHANICAL OPTIONALS			
Drain			
Rubber drain plug	S	S	S
Plastic drain plug (open) - Automatic	NA	NA	NA
Plastic drain plug (close)	NA	NA	NA
Threaded drain plug	O	O	O
Stainless steel drain plug	O	O	O
T type drain plug	O	O	O
Other mechanical optionals			
Drip cover (recommended for vertical shaft down applications)	O	O	O
Rubber slinger (recommended for vertical shaft up applications)	O	O	O
Stainless steel hardware	O	O	O
Grease outlet through the endshield	O	O	O

IEC FRAME		315L	355M/L	355 A/B
ELECTRICAL OPTIONALS				
Rotor				
Copper Rotor		O	O	O
Winding thermal protection				
Bimetallic alarm thermal protector		O	O	O
Bimetallic tripping thermal protector		O	O	O
Pt100 two wires, one per phase		O	O	O
Pt100 two wires, two per phase		O	O	O
Pt100 three wires, one per phase		O	O	O
Pt100 three wires, two per phase		O	O	O
Alarm thermistor		O	O	O
Tripping thermistor		S	S	S
Bearing thermal protection				
Bimetallic thermal protector		O	O	O
Thermistor		O	O	O
Pt100 two wires		O	O	O
Pt100 three wires		O	O	O
Space heaters				
Space heaters	2 x 70W	O	NA	NA
	2 x 87W	NA	O	O
110-127 V		O	O	O
230V		O	O	O
220-240 V		O	O	O
110-127 / 220-240 V		O	O	O
380-480 V		O	O	O
Rotation direction				
Both		S	S	S
Clockwise rotation direction		O	O	O
Counter clockwise rotation direction		O	O	O
Nameplate with indication of rotation direction		S	S	S
Service factor				
Service factor 1.00		S	S	S
Service factor 1.15		O	O	O
Insulation class				
F		S	S	S
H		O	O	O
Forced ventilation kit				
Forced ventilation kit with encoder provision (inform auxiliary motor voltage)		O	O	O
Forced ventilation kit without encoder provision (inform auxiliary motor voltage)		O	O	O
Encoder		O	O	O
Drive end side grounding brush		O	O	O
Non drive end side grounding brush		O	O	O

S (Standard)
O (Optional)
NA (Not available)

Notes: 1) Other optional features, on request.

2) Some combinations of optional features are not possible - please contact WEG

14. Electrical Data

W22 High Voltage
3300V - 50Hz

Output		Frame IEC		T_n (Nm)	I_S / I_n	T_S / T_n	T_{max} / T_n	Inertia J Kgm²	Allowable locked rotor time Cold/ Hot (s)	Weight Kg	Sound dB(A)	Y 3300V/50Hz							
												rpm min⁻¹	% of full load						I_n (A)
													Efficiency η			Power Factor Cos φ			
kW	HP												50	75	100	50	75	100	
II Pole - 3000 min⁻¹																			
90	125	315L		289	6.2	1.2	2.3	1.10	44/20	1000	78	2970	91.5	92.8	92.9	0.76	0.83	0.86	19.7
110	150	315L		353	6.5	1.3	2.5	1.36	44/20	1050	78	2973	92.4	93.5	93.6	0.77	0.84	0.87	23.6
132	175	315L		423	6.5	1.3	2.5	1.53	44/20	1100	78	2973	93.1	94.0	94.0	0.77	0.84	0.87	28.2
150	200	315L		481	6.5	1.3	2.5	1.60	44/20	1200	78	2973	93.3	94.2	94.2	0.77	0.84	0.87	32.0
160	220	315L		514	6.5	1.3	2.5	1.66	44/20	1200	78	2974	93.6	94.4	94.4	0.77	0.84	0.87	34.1
185	250	315L		593	7.2	1.5	2.5	1.81	44/20	1300	78	2977	93.9	94.7	94.7	0.77	0.84	0.87	39.2
200	270	315L	(1)	641	7.2	1.6	2.5	1.81	26/12	1300	78	2977	94.0	94.7	94.7	0.72	0.82	0.86	43.1
200	270	355M/L		642	6.8	1.4	2.5	3.07	44/20	1700	80	2976	93.8	94.6	94.7	0.80	0.86	0.88	42.0
220	300	355A/B		705	6.8	1.7	2.5	3.25	44/20	1800	83	2981	93.8	94.7	94.8	0.78	0.85	0.87	46.5
250	340	355A/B		801	6.8	1.7	2.5	3.69	44/20	1900	83	2981	94.2	95.0	95.1	0.78	0.85	0.87	52.9
260	350	355A/B		833	6.8	1.7	2.5	3.69	44/20	1900	83	2981	94.4	95.2	95.2	0.78	0.85	0.87	54.9
280	380	355A/B		897	6.8	1.7	2.5	4.13	44/20	2000	83	2982	94.6	95.3	95.3	0.78	0.85	0.87	59.1
300	400	355A/B		960	7.2	1.7	2.5	4.13	44/20	2000	83	2982	94.7	95.4	95.4	0.78	0.85	0.87	63.2
315	430	355A/B		1009	7.2	1.8	2.5	4.50	40/18	2100	83	2983	94.8	95.5	95.5	0.78	0.85	0.87	66.3
330	450	355A/B		1058	7.2	1.8	2.5	4.87	40/18	2200	83	2983	94.9	95.6	95.6	0.78	0.85	0.87	69.4
355	480	355A/B		1137	7.9	2,0	2.5	4.87	40/18	2300	83	2985	95.0	95.7	95.8	0.78	0.85	0.87	74.5
370	500	355A/B	(1)	1186	7.9	2,0	2.5	4.87	40/18	2300	83	2983	95.1	95.8	95.8	0.78	0.85	0.87	77.7
400	550	355A/B	(1)	1284	7.2	1.8	2.5	4.87	33/15	2300	83	2983	95.3	95.9	95.8	0.78	0.85	0.87	83.9
IV Pole - 1500 min⁻¹																			
90	125	315L		578	6.5	1.2	2.5	3.27	44/20	900	74	1486	91.7	92.8	92.9	0.69	0.78	0.83	20.4
110	150	315L		707	6.5	1.2	2.5	3.48	44/20	950	74	1486	92.4	93.3	93.3	0.69	0.78	0.83	24.8
132	175	315L		848	6.5	1.3	2.5	3.74	40/18	1000	74	1487	92.3	93.4	93.4	0.69	0.78	0.83	29.6
150	200	315L		963	6.8	1.4	2.5	3.98	40/18	1100	74	1487	92.5	93.5	93.5	0.69	0.78	0.83	33.8
160	220	315L		1029	6.8	1.4	2.5	3.98	33/15	1100	74	1487	92.7	93.7	93.8	0.69	0.78	0.83	36.0
185	250	315L		1186	6.5	1.3	2.5	4.46	33/15	1200	74	1486	93.7	94.3	94.1	0.70	0.80	0.84	40.9
200	270	315L	(1)	1284	7.0	1.4	2.5	4.46	26/12	1200	74	1486	93.9	94.5	94.3	0.70	0.80	0.84	44.2
200	270	355M/L		1284	6.5	1.8	2.5	7.19	44/20	1800	76	1487	93.7	94.5	94.5	0.70	0.80	0.83	44.6
220	300	355M/L		1411	6.5	1.8	2.5	7.19	44/20	1800	76	1487	93.8	94.6	94.6	0.70	0.80	0.83	49.0
250	340	355A/B		1607	6.5	1.8	2.5	9.19	44/20	2000	76	1487	94.0	94.8	94.7	0.73	0.82	0.85	54.2
260	350	355A/B		1666	6.5	1.8	2.5	9.19	44/20	2000	76	1488	94.1	94.9	94.9	0.73	0.82	0.85	56.3
280	380	355A/B		1793	6.5	1.8	2.5	9.71	44/20	2100	76	1488	94.2	94.9	94.9	0.73	0.82	0.85	60.7
300	400	355A/B		1921	6.5	1.8	2.5	9.71	44/20	2100	76	1488	94.4	95.1	95.0	0.73	0.81	0.85	65.0
315	430	355A/B		2019	6.5	1.8	2.5	9.83	44/20	2100	76	1488	94.7	95.3	95.2	0.73	0.81	0.85	68.4
330	450	355A/B		2117	6.5	1.8	2.5	10.7	44/20	2200	76	1488	94.8	95.3	95.2	0.73	0.81	0.85	71.7
355	480	355A/B	(1)	2274	6.5	1.8	2.5	10.7	44/20	2200	76	1488	94.9	95.4	95.3	0.73	0.81	0.85	76.8
370	500	355A/B	(1)	2372	6.5	1.8	2.5	10.7	44/20	2200	76	1487	94.9	95.3	95.2	0.73	0.81	0.85	80.3
VI Pole - 1000 min -1																			
90	125	315L		873	6.5	1.7	2.5	4.44	26/12	1200	68	984	93.1	93.4	92.9	0.64	0.74	0.79	21.4
110	150	315L		1068	6.5	1.7	2.5	4.76	26/12	1300	68	984	93.4	93.7	93.2	0.64	0.74	0.79	26.1
132	175	315L		1284	6.5	1.7	2.5	5.26	22/10	1400	68	984	93.6	93.8	93.2	0.62	0.73	0.79	31.4
150	200	315L		1450	6.5	1.7	2.5	5.26	18/8	1400	68	984	93.7	93.9	93.3	0.62	0.73	0.79	35.7
160	220	315L	(1)	1548	6.5	1.7	2.5	5.26	18/8	1400	68	984	93.8	94.0	93.4	0.62	0.73	0.79	38.1
160	220	355M/L		1539	6.5	1.7	2.5	9.87	40/18	1700	73	990	93.0	93.8	93.8	0.62	0.73	0.78	38.4
185	250	355M/L		1784	6.5	1.7	2.5	11.2	40/18	1800	73	991	93.1	94.0	93.9	0.62	0.73	0.78	44.1
200	270	355A/B		1931	6.5	1.7	2,5	12.0	40/18	2000	73	990	93.8	94.4	94.2	0.62	0.73	0.78	47.6
220	300	355A/B		2117	6.5	1.7	2,5	12.7	40/18	2100	73	990	94.1	94.6	94.4	0.62	0.73	0.78	52.3
250	340	355A/B		2411	6.5	1.7	2.5	13.8	40/18	2200	73	990	94.3	94.8	94.6	0.62	0.73	0.78	59.2
260	350	355A/B		2509	6.5	1.7	2.5	13.8	40/18	2200	73	990	94.3	94.8	94.7	0.62	0.73	0.78	61.5
280	380	355A/B		2695	7.0	1.9	2.5	15.0	33/15	2300	73	990	94.2	94.9	94.8	0.61	0.72	0.78	66.3
300	400	355A/B	(1)	2891	6.8	1.8	2.5	15.0	33/15	2300	73	990	94.5	95.0	94.8	0.61	0.72	0.78	71.2
315	430	355A/B	(1)	3038	7.2	2,0	2.5	15.5	22/10	2350	73	991	93.9	94.7	94.7	0.56	0.68	0.75	77.7

Output		Frame IEC		T_n (Nm)	I_S / I_n	T_S / T_n	T_{max} / T_n	Inertia J Kgm²	Allowable locked rotor time Cold/ Hot (s)	Weight Kg	Sound dB(A)	Y 3300V/50Hz							
												rpm min^{-1}	% of full load						I_n (A)
													Efficiency η			Power Factor Cos φ			
kW	HP												50	75	100	50	75	100	
VIII Pole - 750 min^{-1}																			
90	125	315L		1156	6.2	1.7	2.2	5.07	33/15	1200	68	741	92.6	93.2	93.0	0.51	0.63	0.70	24.1
110	150	315L		1421	6.2	1.7	2.2	5.40	26/12	1300	68	741	92.8	93.4	93.0	0.51	0.64	0.70	29.5
132	175	315L		1705	6.2	1.7	2.2	6.06	22/10	1400	68	740	93.0	93.5	93.1	0.52	0.65	0.71	34.9
132	175	355M/L		1695	6.2	1.7	2.3	10.6	40/18	1700	70	742	93.3	93.8	93.5	0.58	0.70	0.75	32.9
150	200	355M/L		1931	6.2	1.7	2.3	10.6	40/18	1800	70	742	93.2	93.8	93.5	0.58	0.69	0.75	37.4
160	220	355A/B		2058	6.2	1.7	2.3	11.2	40/18	2000	70	742	93.3	93.9	93.7	0.58	0.69	0.75	39.9
185	250	355A/B		2381	6.2	1.7	2.3	13.9	40/18	2100	70	742	93.6	94.2	93.9	0.58	0.69	0.75	46.0
200	270	355A/B		2577	6.2	1.7	2.3	13.9	33/15	2200	70	742	94.3	94.6	94.2	0.59	0.70	0.76	48.9
220	300	355A/B	(1)	2832	6.8	1.9	2.6	15.0	26/12	2300	70	742	93.8	94.4	94.3	0.50	0.64	0.71	57.3

(1) Temperature rise 105K, at full load

Tn = Full load torque
Is / In = Locked rotor current
Ts / Tn = Locked rotor torque

Tmax / Tn = Breakdown torque
In = Full load current

Notes:
- The indicated values for sound pressure levels are @ 1m no load, with 3 dB(A) tolerance
- All values are according to IEC 60034-1 tolerances
- This data can be changed without prior notice

W22 High Voltage
6000V - 50Hz

Output		Frame IEC	T_n (Nm)	I_S / I_n	T_S / T_n	T_{max} / T_n	Inertia J Kgm²	Allowable locked rotor time(s) Cold/ Hot	Weight Kg	Sound dB(A)	Y 6000V/50Hz							
												% of full load						I_n (A)
												Efficiency η			Power Factor Cos ϕ			
kW	HP										rpm min⁻¹	50	75	100	50	75	100	
II Pole - 3000 min⁻¹																		
90	120	W22 315L	289	6.7	1.5	2.5	1.3	10/5	1135	78	2970	91.3	93.6	94.5	0.76	0.83	0.86	10.7
110	150	W22 315L	354	6.8	1.6	2.6	1.5	8/4	1225	78	2970	92.0	93.9	94.6	0.78	0.85	0.87	12.9
132	180	W22 315L	424	6.8	1.6	2.6	1.6	8/4	1315	78	2970	92.3	94.0	94.7	0.79	0.85	0.87	15.4
160	215	W22 355ML	512	7.5	1.4	3.1	3.4	15/7	1770	80	2987	93.4	94.8	95.3	0.78	0.85	0.87	18.6
200	270	W22 355ML	639	7.5	1.4	3.1	3.8	10/5	1830	80	2987	94.1	95.2	95.6	0.80	0.85	0.87	23.1
250	340	W22 355AB	801	7.0	1.5	2.7	4.9	10/5	2040	83	2982	95.5	96.1	96.3	0.81	0.87	0.89	28.1
280	380	W22 355AB	897	7.5	1.5	2.9	5.2	10/5	2160	83	2982	95.7	96.3	96.5	0.81	0.87	0.89	31.4
315	425	W22 355AB	1009	7.5	1.5	2.9	5.5	8/4	2230	83	2982	95.9	96.5	96.6	0.82	0.88	0.89	35.3
355	480	W22 355AB	1137	7.5	1.5	2.9	5.9	8/4	2300	83	2983	96.0	96.6	96.7	0.82	0.87	0.89	39.7
IV Pole - 1500 min⁻¹																		
90	120	W22 315L	577	6.7	1.4	2.5	1.7	43/20	1215	74	1490	91.9	93.5	94.1	0.59	0.70	0.76	12.1
110	150	W22 315L	705	6.7	1.4	2.5	1.9	32/15	1330	74	1490	92.4	93.8	94.4	0.59	0.70	0.76	14.8
132	180	W22 315L	846	6.7	1.4	2.5	2.0	32/15	1400	74	1490	93.0	94.2	94.7	0.60	0.70	0.76	17.6
160	215	W22 355ML	1026	6.5	1.1	3.0	5.6	39/18	1560	76	1490	93.4	94.8	95.3	0.72	0.81	0.84	19.2
200	270	W22 355ML	1282	6.5	1.1	3.0	6.5	34/16	1670	76	1490	94.0	95.1	95.5	0.73	0.81	0.84	24.0
250	340	W22 355AB	1602	7.0	1.3	3.0	7.6	23/11	2090	76	1490	94.7	95.8	96.1	0.72	0.81	0.84	29.8
280	380	W22 355AB	1795	7.0	1.3	3.0	7.8	21/10	2150	76	1490	94.7	95.8	96.1	0.72	0.80	0.84	33.4
315	425	W22 355AB	2019	7.0	1.3	3.0	8.4	19/9	2200	76	1490	95.0	95.9	96.2	0.72	0.81	0.84	37.5
355	480	W22 355AB	2275	7.0	1.3	3.0	9.0	17/8	2245	76	1490	95.1	96.0	96.3	0.72	0.81	0.84	42.2
VI Pole - 1000 min⁻¹																		
90	120	W22 315L	870	6.7	1.4	2.4	3.0	39/18	1200	68	988	92.4	93.4	93.6	0.59	0.69	0.75	12.3
110	150	W22 315L	1063	6.7	1.4	2.4	3.2	39/18	1345	68	988	93.2	93.9	93.9	0.59	0.69	0.75	15.0
132	180	W22 355ML	1273	6.8	1.2	2.9	5.8	47/22	1750	73	990	94.6	95.3	95.3	0.74	0.80	0.82	16.3
160	215	W22 355ML	1543	6.8	1.3	3.1	6.4	47/22	1800	73	990	94.6	95.3	95.4	0.72	0.79	0.82	19.7
200	270	W22 355AB	1929	6.8	1.4	2.9	7.4	47/22	1840	73	990	94.9	95.4	95.5	0.73	0.80	0.82	24.6
250	340	W22 355AB	2412	6.8	1.4	2.9	8.3	47/22	1980	73	990	94.9	95.5	95.5	0.72	0.79	0.82	30.7
280	380	W22 355AB	2701	6.8	1.5	3.0	9.0	43/20	2100	73	990	95.2	95.7	95.6	0.73	0.80	0.82	34.4
315	425	W22 355AB	3039	6.8	1.5	3.0	9.3	43/20	2340	73	990	95.2	95.7	95.7	0.73	0.80	0.82	38.6
VIII Pole - 750 min⁻¹																		
90	120	W22 315L	1158	7.5	1.4	2.4	3.8	37/17	1180	68	742	89.3	91.3	92.0	0.50	0.63	0.71	13.3
110	150	W22 355ML	1420	6.8	1.3	2.4	7.7	39/18	1570	70	740	94.2	94.7	94.5	0.69	0.77	0.80	14.0
132	180	W22 355ML	1704	6.8	1.3	2.4	8.3	39/18	1650	70	740	94.6	94.9	94.6	0.71	0.78	0.80	16.8
160	215	W22 355AB	2065	6.8	1.3	2.4	9.1	39/18	1725	70	740	94.8	95.0	94.7	0.71	0.78	0.80	20.3
200	270	W22 355AB	2581	6.8	1.3	2.4	9.6	37/17	1840	70	740	94.9	95.1	94.8	0.70	0.78	0.80	25.4

(1) Temperature rise 105K, at full load

Tn = Full load torque
Is / In = Locked rotor current
Ts / Tn = Locked rotor torque

Tmax / Tn = Breakdown torque
In = Full load current

Notes:
- The indicated values for sound pressure levels are @ 1m no load, with 3 dB(A) tolerance
- All values are according to IEC 60034-1 tolerances
- This data can be changed without prior notice

W22 High Voltage
4160V - 60Hz

Output		Frame IEC	T_n (Nm)	I_S / I_n	T_S / T_n	T_{max} / T_n	Inertia J Kgm²	Allowable locked rotor time Cold/Hot (s)	Weight Kg	Sound dB(A)	Y 4160V/60Hz							
												% of full load						
												Efficiency η			Power Factor Cos φ			I_n (A)
kW	HP										rpm min⁻¹	50	75	100	50	75	100	
II Pole - 3000 min⁻¹																		
90	125	315L	240	7.3	1.4	3.0	1.23	44/20	1000	82	3576	90.2	91.7	92.4	0.72	0.81	0.85	15.9
110	150	315L	294	7.3	1.4	3	1.23	44/20	1050	82	3576	91.7	92.4	93.0	0.72	0.81	0.85	19.3
132	175	315L	353	7.3	1.4	3	1.36	44/20	1070	82	3576	91.7	93.0	93.6	0.72	0.81	0.85	23.0
150	200	315L	401	7.3	1.4	3	1.44	44/20	1080	82	3576	92.4	93.6	94.1	0.72	0.82	0.85	26.0
160	220	315L	427	7.3	1.4	3	1.52	33/15	1100	82	3578	92.9	93.9	94.4	0.73	0.83	0.86	27.4
185	250	315L	494	7.3	1.4	3	1.66	33/15	1200	82	3578	93.2	94.2	94.6	0.74	0.83	0.86	31.6
200	270	315L	533	7.6	1.5	3	1.85	26/12	1300	82	3578	93.6	94.5	94.7	0.73	0.82	0.86	34.1
220	300	315L (1)	587	7.6	1.5	3	1.85	26/12	1300	82	3578	93.6	94.5	94.7	0.73	0.82	0.86	37.5
220	300	355M/L	587	7.5	1.4	3	2.75	44/20	1600	84	3580	94.0	94.4	95.0	0.78	0.85	0.88	36.5
250	340	355M/L	666	7.5	1.4	3	3.07	44/20	1700	84	3580	94.1	94.5	95.1	0.78	0.85	0.88	41.5
260	350	355M/L	693	7.5	1.4	3	3.07	44/20	1700	84	3580	94.1	94.5	95.1	0.78	0.85	0.88	43.1
300	400	355A/B	800	7.8	1.6	2.5	3.86	44/20	1900	89	3582	94.5	95.0	95.4	0.80	0.86	0.88	49.6
315	430	355A/B	840	7.8	1.6	2.5	4.08	44/20	2000	89	3582	94.5	95.4	95.4	0.80	0.86	0.88	52.1
330	450	355A/B	879	7.8	1.6	2.5	4.08	44/20	2000	89	3582	94.5	95.4	95.4	0.80	0.86	0.88	54.6
355	480	355A/B	946	7.8	1.6	2.5	4.44	33/15	2100	89	3582	95.0	95.8	95.8	0.80	0.86	0.88	58.4
370	500	355A/B	990	7.8	1.6	2.5	4.44	33/15	2100	89	3582	95.0	95.8	95.8	0.80	0.86	0.88	60.9
400	550	355A/B	1068	7.8	1.6	2.5	4.87	33/15	2200	89	3582	95.4	95.8	95.8	0.80	0.86	0.88	65.9
440	600	355A/B (1)	1176	8.1	1.7	2.5	4.87	33/15	2200	89	3582	95.4	95.8	96.2	0.78	0.85	0.87	73.0
IV Pole - 1500 min⁻¹																		
110	150	315L	588	6.6	1.6	2.5	2.99	44/20	880	79	1786	91.2	92.5	93.1	0.69	0.78	0.83	19.8
132	175	315L	706	6.6	1.6	2.5	3.31	44/20	900	79	1786	91.7	93.0	93.6	0.71	0.80	0.84	23.3
150	200	315L	802	6.6	1.6	2.5	3.52	44/20	950	79	1786	92.7	93.8	93.9	0.71	0.80	0.84	26.4
160	220	315L	856	6.6	1.6	2.5	3.71	44/20	1000	79	1786	93.0	94.0	94.1	0.71	0.80	0.84	28.1
185	250	315L	990	6.6	1.6	2.5	4.06	44/20	1100	79	1786	93.2	94.1	94.3	0.71	0.80	0.84	32.4
200	270	315L	1068	6.9	1.7	2.5	4.55	40/18	1200	79	1786	93.5	94.4	94.5	0.71	0.80	0.84	35.0
220	300	315L (1)	1176	7.1	1.8	2.7	4.55	40/18	1200	79	1786	93.8	94.6	94.7	0.71	0.80	0.84	38.4
220	300	355M/L	1176	7.4	2.1	2.7	7.17	55/25	1800	81	1789	93.3	94.4	94.9	0.68	0.78	0.83	38.8
250	340	355M/L	1333	7.6	2.1	2.7	7.72	55/25	1900	81	1789	93.6	94.6	95.1	0.66	0.77	0.82	44.5
260	350	355M/L	1392	7.6	2.1	2.7	7.72	55/25	1900	81	1789	93.6	94.6	95.1	0.66	0.77	0.82	46.3
280	380	355A/B	1490	7.6	2.1	2.7	8.65	55/25	2000	81	1789	94.0	95.0	95.1	0.70	0.80	0.84	48.6
300	400	355A/B	1597	7.6	2.1	2.7	9.19	55/25	2000	81	1789	94.0	95.0	95.1	0.70	0.80	0.84	52.1
315	430	355A/B	1676	7.6	2.1	2.7	9.83	55/25	2100	81	1789	94.2	95.0	95.3	0.70	0.80	0.84	54.6
330	450	355A/B	1764	7.6	2.1	2.7	9.83	55/25	2100	81	1789	94.3	95.0	95.4	0.70	0.80	0.84	57.2
355	480	355A/B	1891	7.6	2.1	2.7	10.8	55/25	2200	81	1789	94.5	95.1	95.5	0.70	0.80	0.84	61.4
370	500	355A/B	1970	7.6	2.1	2.7	10.8	55/25	2200	81	1789	94.7	95.2	95.6	0.70	0.80	0.84	63.9
400	550	355A/B (1)	2136	8.0	2.2	2.8	10.8	44/20	2200	81	1789	94.8	95.4	95.6	0.70	0.80	0.84	69.1
440	600	355A/B (1)	2352	7.6	2.1	2.7	10.8	44/20	2200	81	1788	95.0	95.5	95.7	0.70	0.80	0.84	76.0
VI Pole - 1000 min -1																		
90	125	315L	726	6.4	1.3	2.1	3.70	35/16	1100	71	1183	92.5	92.7	92.7	0.64	0.75	0.80	16.8
110	150	315L	888	6.4	1.3	2.1	4.40	37/17	1200	71	1182	92.8	92.9	92.9	0.67	0.77	0.81	20.3
132	175	315L	1068	6.4	1.3	2.1	4.80	31/14	1300	71	1182	93.0	93.2	93.3	0.67	0.77	0.81	24.2
150	200	315L	1215	6.6	1.3	2.1	4.80	31/14	1300	71	1182	93.2	93.6	93.6	0.66	0.77	0.81	27.5
160	220	315L	1294	6.6	1.3	2.2	5.20	26/12	1400	71	1182	93.5	93.8	93.8	0.65	0.77	0.81	29.2
185	250	315L (1)	1490	6.8	1.3	2.2	5.20	26/12	1400	71	1182	93.7	93.9	93.9	0.64	0.76	0.80	34.2
185	250	355M/L	1480	7.0	1.7	2.3	10.4	42/19	1700	77	1191	92.9	94.0	94.3	0.60	0.71	0.77	35.4
200	270	355M/L	1607	7.0	1.7	2.3	11.1	42/19	1800	77	1191	93.0	94.1	94.4	0.60	0.71	0.77	38.2
220	300	355M/L	1764	7.2	1.7	2.3	11.9	42/19	1900	77	1191	93.2	94.2	94.5	0.60	0.71	0.77	42.0
250	340	355A/B	1999	7.0	1.7	2.3	12.7	33/15	2000	77	1191	93.7	94.6	94.6	0.60	0.71	0.77	47.6
260	350	355A/B	2087	7.0	1.7	2.3	12.7	33/15	2000	77	1191	93.7	94.6	94.6	0.60	0.71	0.77	49.5
280	380	355A/B	2244	7.0	1.7	2.3	13.0	40/18	2100	77	1191	93.9	94.8	94.8	0.60	0.71	0.77	53.2
300	400	355A/B	2401	7.2	1.8	2.4	13.8	40/18	2200	77	1191	94.0	94.9	95.0	0.59	0.71	0.77	56.9
315	430	355A/B	2528	7.0	1.6	2.2	15.0	26/12	2300	77	1190	94.2	95.0	95.1	0.60	0.72	0.78	58.9
330	450	355A/B	2646	6.8	1.5	2.1	15.0	26/12	2300	77	1190	94.3	95.0	95.1	0.62	0.73	0.78	61.7
355	480	355A/B (1)	2852	6.8	1.5	2.1	15.4	26/12	2400	77	1190	94.3	95.0	95.1	0.61	0.72	0.78	66.4
370	500	355A/B (1)	2969	6.8	1.5	2.1	15.4	26/12	2400	77	1190	94.3	95.0	95.1	0.61	0.72	0.78	69.2
VIII Pole - 750 min⁻¹																		
90	125	315L	963	6.3	1.8	2.1	4.80	33/15	1200	71	892	91.8	92.9	93.0	0.51	0.63	0.70	19.2
110	150	315L	1176	6.5	2	2.5	5.40	31/14	1300	71	892	92.2	93.0	93.1	0.51	0.63	0.70	23.4
132	175	315L	1411	6.3	1.8	2.2	5.80	24/11	1400	71	891	92.5	93.4	93.3	0.49	0.62	0.69	28.5
150	200	315L (1)	1607	6.3	1.8	2.2	5.80	24/11	1400	71	891	92.6	93.4	93.5	0.49	0.62	0.69	32.3
150	200	355M/L	1607	6.6	1.8	2.4	11.8	46/21	1700	75	893	92.6	93.7	94.0	0.53	0.65	0.73	30.3
160	220	355M/L	1715	6.6	1.8	2.4	12.6	46/21	1800	75	893	92.8	93.9	94.1	0.53	0.65	0.73	32.3
185	250	355M/L	1980	6.7	1.8	2.4	12.6	46/21	1800	75	893	93.0	94.0	94.2	0.53	0.65	0.73	37.3
200	270	355A/B	2136	6.6	1.8	2.4	13.0	40/18	2000	75	893	93.3	94.2	94.4	0.53	0.65	0.73	40.3
220	300	355A/B	2352	6.6	1.8	2.7	13.7	40/18	2100	75	893	93.6	94.4	94.5	0.53	0.65	0.73	44.3
250	340	355A/B	2675	6.8	2	2.9	15.0	37/17	2200	75	893	94.2	94.8	94.9	0.52	0.65	0.72	50.8
260	350	355A/B	2783	6.8	2	2.9	15.0	37/17	2200	75	893	94.2	94.8	94.9	0.52	0.65	0.72	52.8
280	380	355A/B (1)	2999	6.5	1.7	2.5	15.0	26/12	2300	75	891	94.3	94.9	95.0	0.54	0.66	0.73	56.0
300	400	355A/B (1)	3214	6.2	1.7	2.5	15.0	26/12	2300	75	891	94.4	94.9	95.0	0.55	0.67	0.74	59.2

(1) Temperature rise 105K, at full load

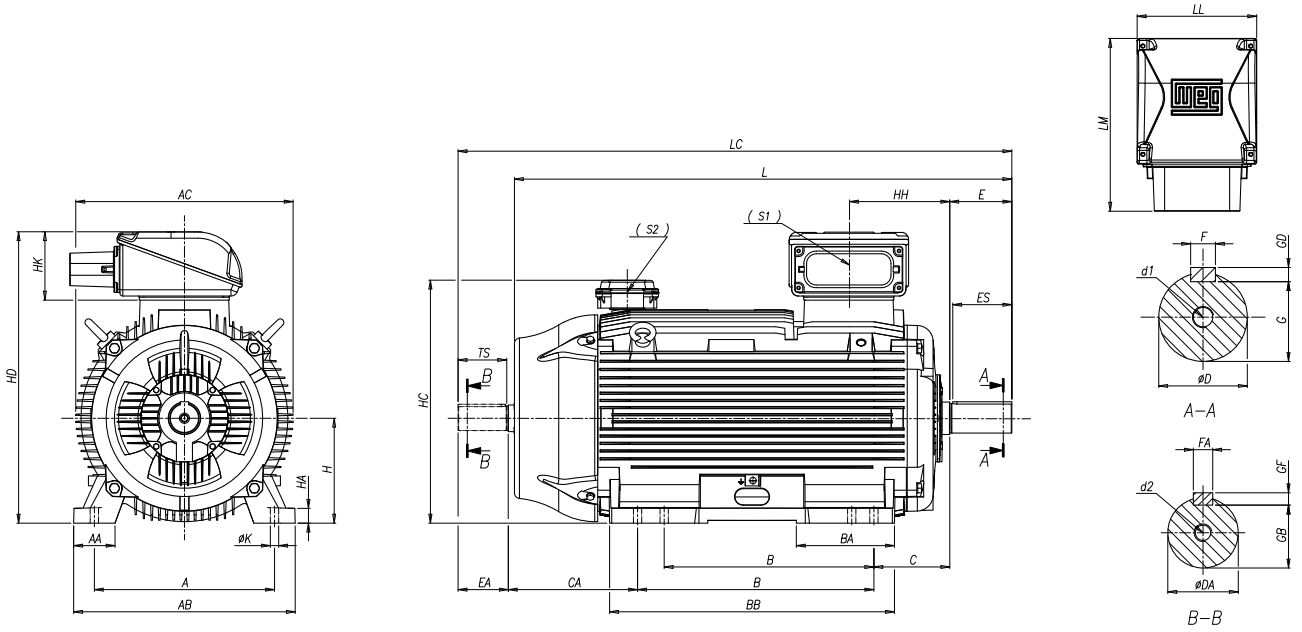
Tn = Full load torque
Is / In = Locked rotor current
Ts / Tn = Locked rotor torque

Tmax / Tn = Breakdown torque
In = Full load current

Notes:
- The indicated values for sound pressure levels are @ 1m no load, with 3 dB(A) tolerance
- All values are according to IEC 60034-1 tolerances
- This data can be changed without prior notice

15. Mechanical Data

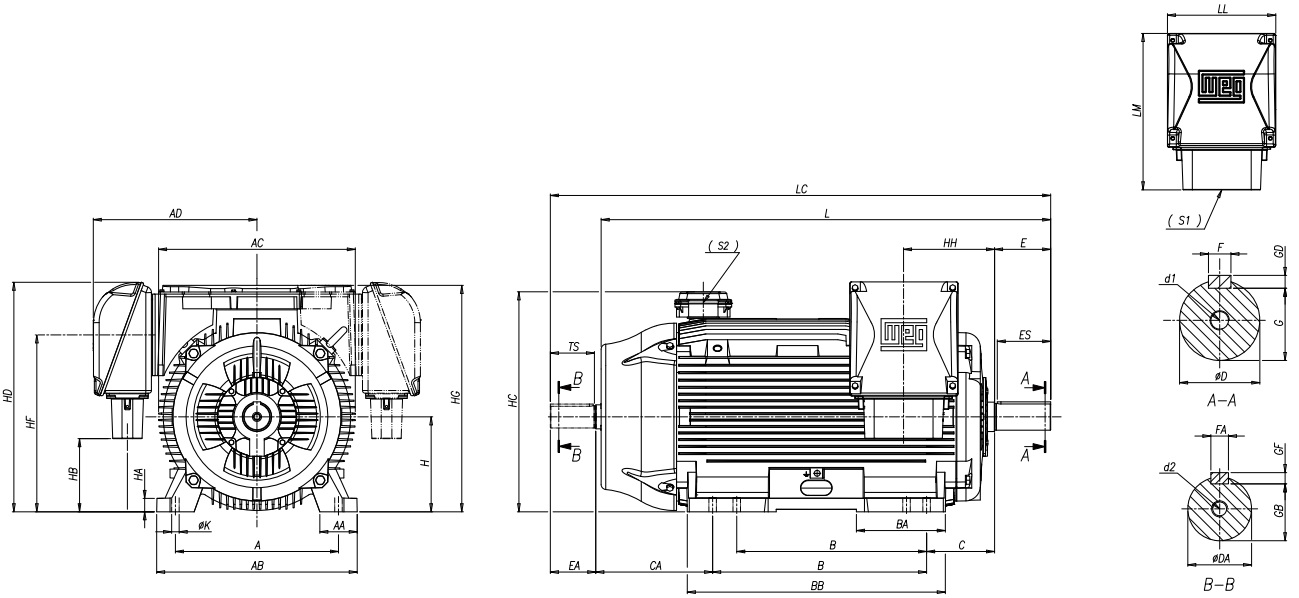
W22 High Voltage
B3T



Frame	Poles	A	AA	AB	AC	B	BA	BB	C	CA	Shaft dimensions										
											D	E	ES	F	G	GD	DA	EA	TS	FA	GB	GF
315L	2P	508	120	630	657	508	219	752	216	497	65m6	140	125	18	58	11	60m6	140	125	18	53	11
	4P+										80m6	170	160	22	71	14	65m6	140	125	18	58	11
355ML	2P	610	140	750	736	560 630	230	760	254	413	75m6	140	125	20	67.5	12	60m6	140	125	18	53	11
	4P+										100m6	210	200	28	90	16	80m6	170	160	22	71	14
355AB	2P	610	140	750	736	710 800	332	965	254	438	75m6	140	125	20	67.5	12	60m6	140	125	18	53	11
	4P+										100m6	210	200	28	90	16	80m6	170	160	22	71	14

Frame	Poles	H	HA	HC	HD	HH	HK	LL	LM	K	L	LC	S1	S2	d1	d2	Bearings	
																	D.E.	N.D.E.
315L	2P	315	48	750	897	285	215	404	585	28	1353	1501	1xM63x1,5	3xM20x1,5	M20	M20	6314 C3	
	4P+										1383	1531			M20		6319 C3	6316 C3
355ML	2P	355	50	822	987	340					1416	1577			M20		6316 C3	6314 C3
	4P+										1486	1677			M24		6322 C3	6319 C3
355AB	2P	355	50	822	987	340					1612	1772			M20		6316 C3	6314 C3
	4P+										1682	1872			M24		6322 C3	6319 C3

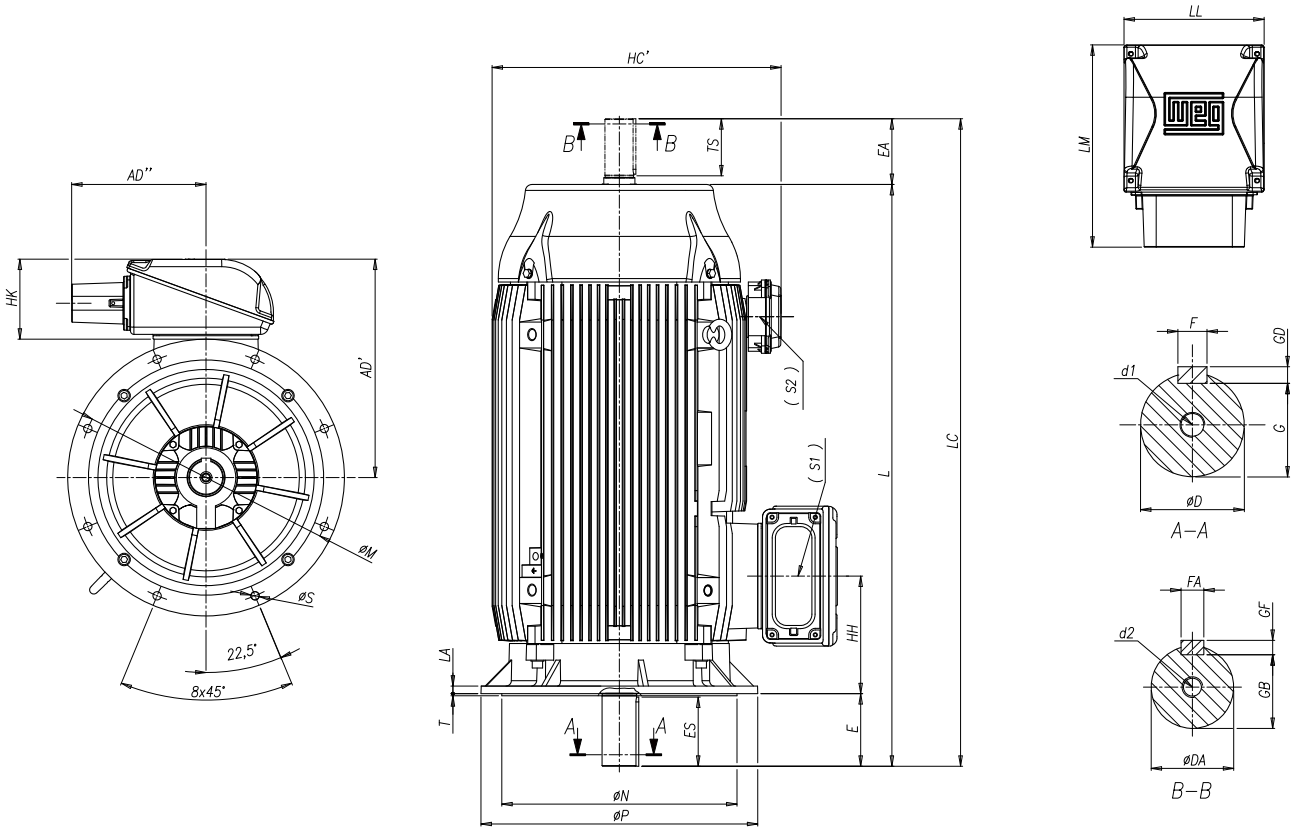
W22 High Voltage
B3R / B3L



Frame	Poles	A	AA	AB	AC	B	BA	BB	C	CA	Shaft dimensions										
											D	E	ES	F	G	GD	DA	EA	TS	FA	GB	GF
315L	2P	508	120	630	657	508	219	752	216	497	65m6	140	125	18	58	11	60m6	140	125	18	53	11
	4P+										80m6	170	160	22	71	14	65m6	140	125	18	58	11
355ML	2P	610	140	750	736	560 630	230	760	254	413	75m6	140	125	20	67.5	12	60m6	140	125	18	53	11
	4P+										100m6	210	200	28	90	16	80m6	170	160	22	71	14
355AB	2P	610	140	750	736	710 800	332	965	254	438	75m6	140	125	20	67.5	12	60m6	140	125	18	53	11
	4P+										100m6	210	200	28	90	16	80m6	170	160	22	71	14

Frame	Poles	H	HA	HC	HH	HD	HB	HF	HK	LL	LM	K	L	LC	S1	S2	d1	d2	Bearings	
																			D.E.	N.D.E.
315L	2P	315	48	750	285	768	184	575	215	404	585	28	1353	1501	1xM63x1,5	3xM20x1,5	M20	M20	6314 C3	
	4P+												1383	1531			M20		6319 C3	6316 C3
355ML	2P	355	50	822	340	858	274	665					1416	1577			M20		6316 C3	6314 C3
	4P+												1486	1677			M24		6322 C3	6319 C3
355AB	2P	355	50	822	340	858	274	665					1612	1772			M20		6316 C3	6314 C3
	4P+												1682	1872			M24		6322 C3	6319 C3

W22 High Voltage
V1

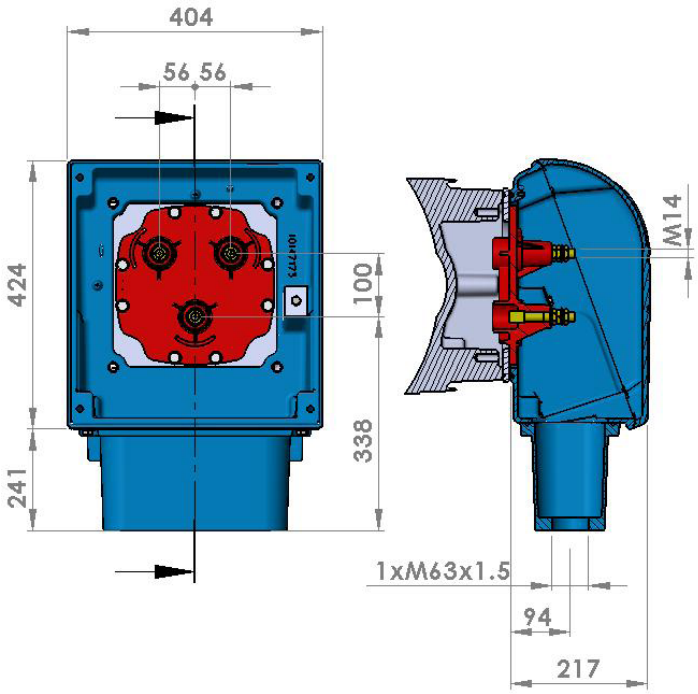


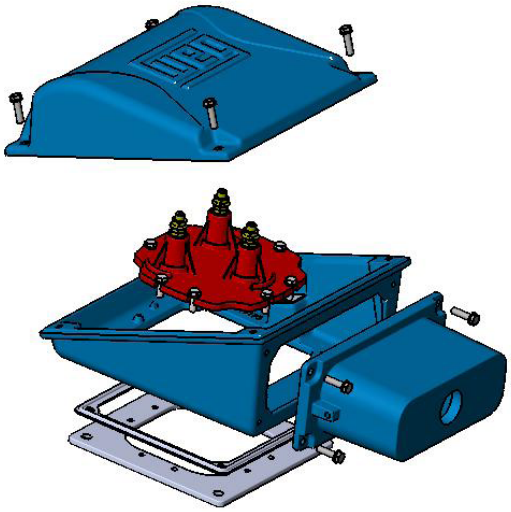
Frame	Poles	Flange	M	N	P	S	T	LA	Shaft dimensions											
									D	E	ES	F	G	GD	DA	EA	TS	FA	GB	GF
315L	2P	FF-600	600	550	660	24	6	22	65m6	140	125	18	58	11	60m6	140	125	18	53	11
	4P+								80m6	170	160	22	71	14	65m6	140	125	18	58	11
355ML	2P	FF-740	740	680	800				75m6	140	125	20	67.5	12	60m6	140	125	18	53	11
	4P+								100m6	210	200	28	90	16	80m6	170	160	22	71	14
355AB	2P	FF-740	740	680	800				75m6	140	125	20	67.5	12	60m6	140	125	18	53	11
	4P+								100m6	210	200	28	90	16	80m6	170	160	22	71	14

Frame	Poles	AD'	AD''	HC'	HH	HK	LL	LM	L	LC	S1	S2	d1	d2	Bearings	
															D.E.	N.D.E.
315L	2P	582	388	762	285	215	404	585	1353	1501	1xM63x1,5	3xM20x1,5	M20	M20	6314 C3	
	4P+								1383	1531					6319 C3	6316 C3
355ML	2P	632		836	340				1416	1577					6316 C3	6314 C3
	4P+								1486	1677			M24		6322 C3	6319 C3
355AB	2P	632		836	340				1612	1772			M20		6316 C3	6314 C3
	4P+								1682	1872			M24		6322 C3	6319 C3

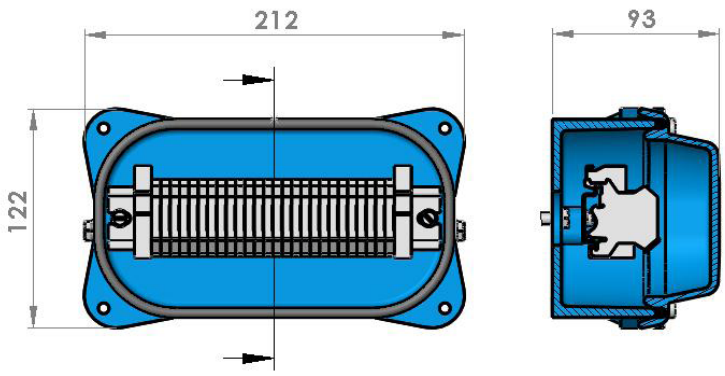
16. Terminal box drawings

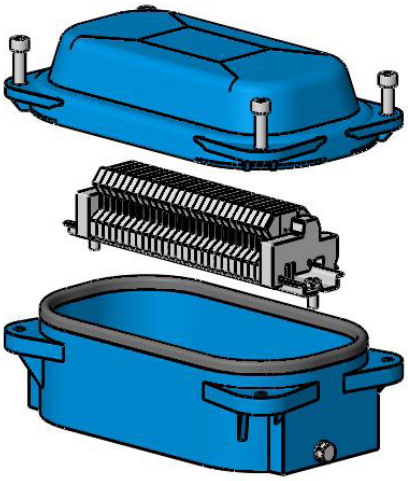
Terminal Box





Auxiliary Terminal Box





17. Drip cover data

The use of a rain drip cover increase the total length of the motor. The additional land length can be seen in figure below.

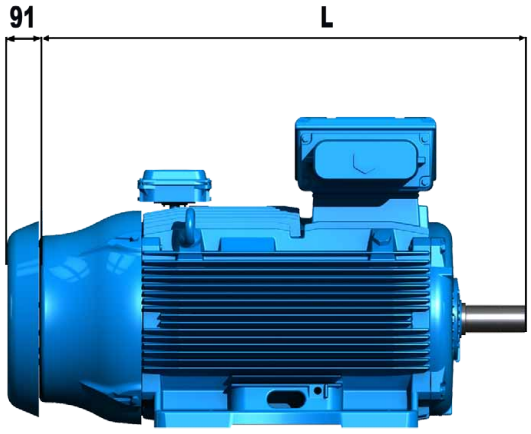


Figure 31 – Motor with drip cover

Side mounted terminal box

Frame	External height (m)	External width (m)	External length (m)	Weight (kg)	Volume (m³)
315L	1,10	1,12	1,70	138	2,10
355M/L	1,20	1,19	1,72	146	2,46
355A/B	1,20	1,19	1,90	163	2,71

Top mounted terminal box

Frame	External height (m)	External width (m)	External length (m)	Weight (kg)	Volume (m³)
315L	1,20	0,90	1,70	111	1,84
355M/L	1,32	1,05	1,73	127	2,40
355A/B	1,32	1,05	1,90	141	2,63

18. Packaging

W22 High Voltage Motors are packed in wooden crates (see figure 32). Dimensions, weights and volumes are in the following tables.

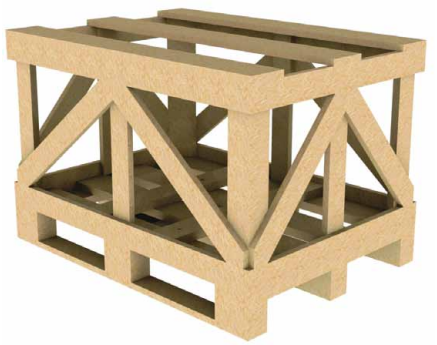


Figure 32 – Road Transport (Wooden crates)

Also available maritime packaging for seafreight expeditions worldwide.

Figure 33 – Maritime Packaging

19. Inquiry and Order Check List

This check list refers the essential information to be transmitted with inquiry/order. The maximum details provided will help both WEG/CUSTOMER to select/supply the correct motor to the application.

19.1 BASIC MOTOR DATA AND FEATURES

Motor Standards:

Basic Design:

- Rating: [kW]
- Frequency: [Hz]
- Poles/Speed:
- Insulation class: (F) / (H)
- Motor temp. rise: [K]
- Design amb. temp. (40ºC)
- Mounting form IM:
- Balancing grade: A ☐ B ☐
- Rotation view from D.E. side: CW ☐ CCW ☐ Both ☐

Supply terminal box arrangement:

- 2nd power term. box: ☐ Neutral point ☐ Other
- Terminal box adapter

Auxiliaries & Accessories:

- Protection on windings (if different from standard): ☐
  - Thermistor: (PTC / NTC)
  - PT100: - Nº phase: - Nº wires:
  - Auxiliary term. box:
- Protection on bearings (if different from standard): ☐
  - Thermistor: (PTC / NTC)
  - PT100: - Nº/bearing: - Nº wires:
  - Auxiliary term. box: ☐ Same termina box of windings protections ☐ 2nd aux terminal box ☐ 2 separate terminal boxes (1/endshield)
- Space heaters (if different from standard): ☐
  - Voltage: [V]
  - Individual terminal box: ☐

Cable Entry Details:

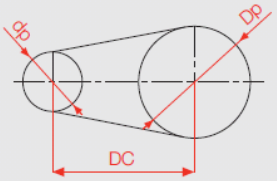
- Cable entry direction view from D.E. side: RHS ☐ LHS ☐
- Nº of cable entries:
  - Supply terminal box:
  - Auxiliary terminal box(es):
  - Glands thread size(s):
- Supply/Instrumentation cable information:
  - Nº cables:
  - Type of cables: (armoured / non armoured)
  - Cables diameter: - External: - Without armour:
- Cable gland supplied with motor: ☐ (WEG can supply glands acc. to info about cables):
  - Cable gland(s) size(s):
  - Cable gland(s) type(s):

19.2 SITE & WORKING CONDITIONS

Starting:

- Starting method:
  - ☐ DOL:
  - ☐ VSD: Speed range:
  - ☐ Soft starter:
  - ☐ Star / Delta:
  - ☐ Other:
- Duty (if different from S1):
- Service factor (if different from 1,0):
- Nº starts/hour: Cold: Hot:

Coupling:



- ☐ Direct
- ☐ Pulley/Belt:
  - Pulleys diam. (dp/Dp):
  - Pulleys width:
  - Distance between centers (DC):
  - Nº/Type belts.:
- ☐ Gearbox.:
  - Gearbox ratio:

Ambient Conditions:

- Ambient temperature: (ºC)
- Min. temperature: (ºC)
- Max. temperature: (ºC)
- Humidity: (%)
- Altitude: (m.a.s.l.)
- Environment: (Saline; Alcaline; Marine; Petrochemical; Sulphur (H_2S); Other...)

Paint Scheme (if different from standard):

- ☐ 202E
- ☐ 202P
- ☐ 211E
- ☐ 211P
- ☐ 212E
- ☐ 212P
- ☐ 213E
- Color (RAL):

Driven Machine Data:

- Driven machine type:
  (centrifugal fan/pump; reciprocating pump/compressor; blower; mills; cranes; conveyor belt; ....)
- Absorved power: [kW]
- Driven machine torque curve:
  (Quadratic; constant; other...)
- Starting torque: [Nm]
- Rated torque: [Nm]
- Load inertia: (J or PD^2)

Notes

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