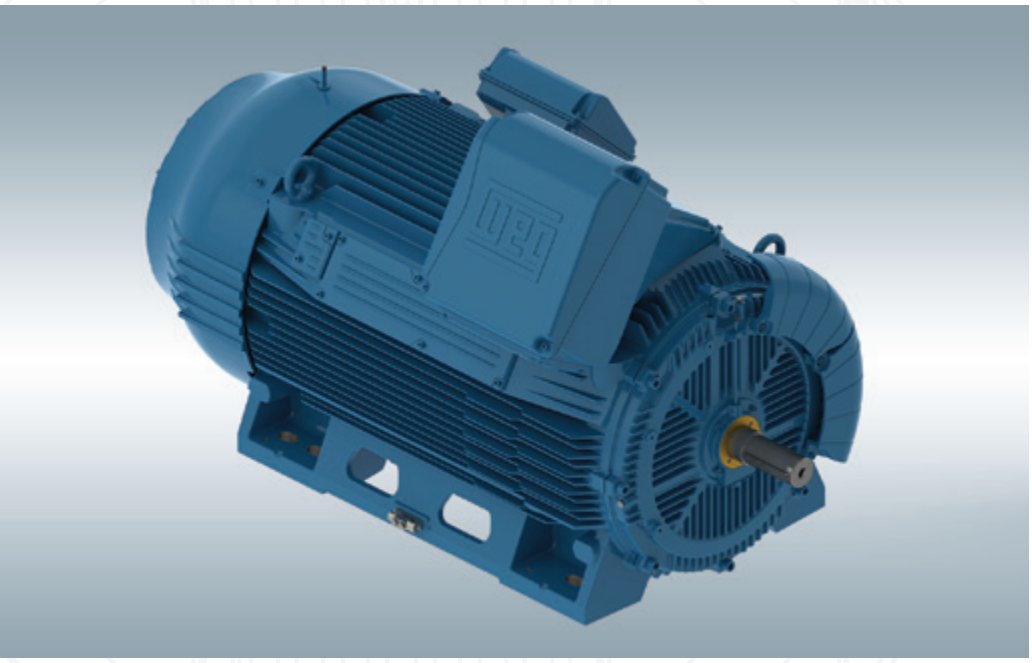
W50

Three-Phase Electric Motor

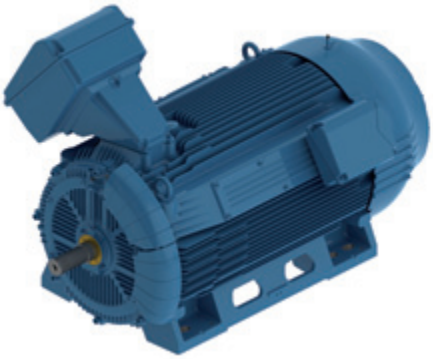
Technical Catalogue
European Market

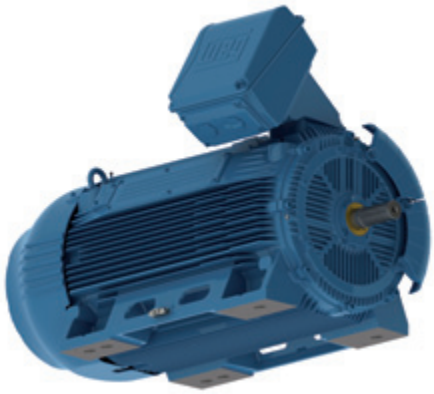


W50 - The New Generation of WEG Motors for Heavy Duty Applications

The W50 motor platform is the most modern option for applications that require high performance and reliability.

The scenario of increasing demand for more compact and efficient electric motors creates the need to develop new products with higher performance, quality, reliability and that exceed the requirements of customers. It is with this concern that WEG introduces its new line of motors for heavy duty applications: the W50.
The W50 motor offers excellent performance and complies with the strictest criteria of efficiency and safety.
Its design was developed using a series of sophisticated computational tools for electromagnetic, structural and thermal analysis and optimization, resulting in a compact, and roboust product with high performance. Its frame ensures great mechanical strength to the motor and its fins provides great heat dissipation, which results in longer lifetime and higher levels of energy efficiency.
The W50 platform also includes optimizations in the supply chain in order to reduce waste and CO_2 emission rates, reinforcing the WEG group concern with the green thinking.

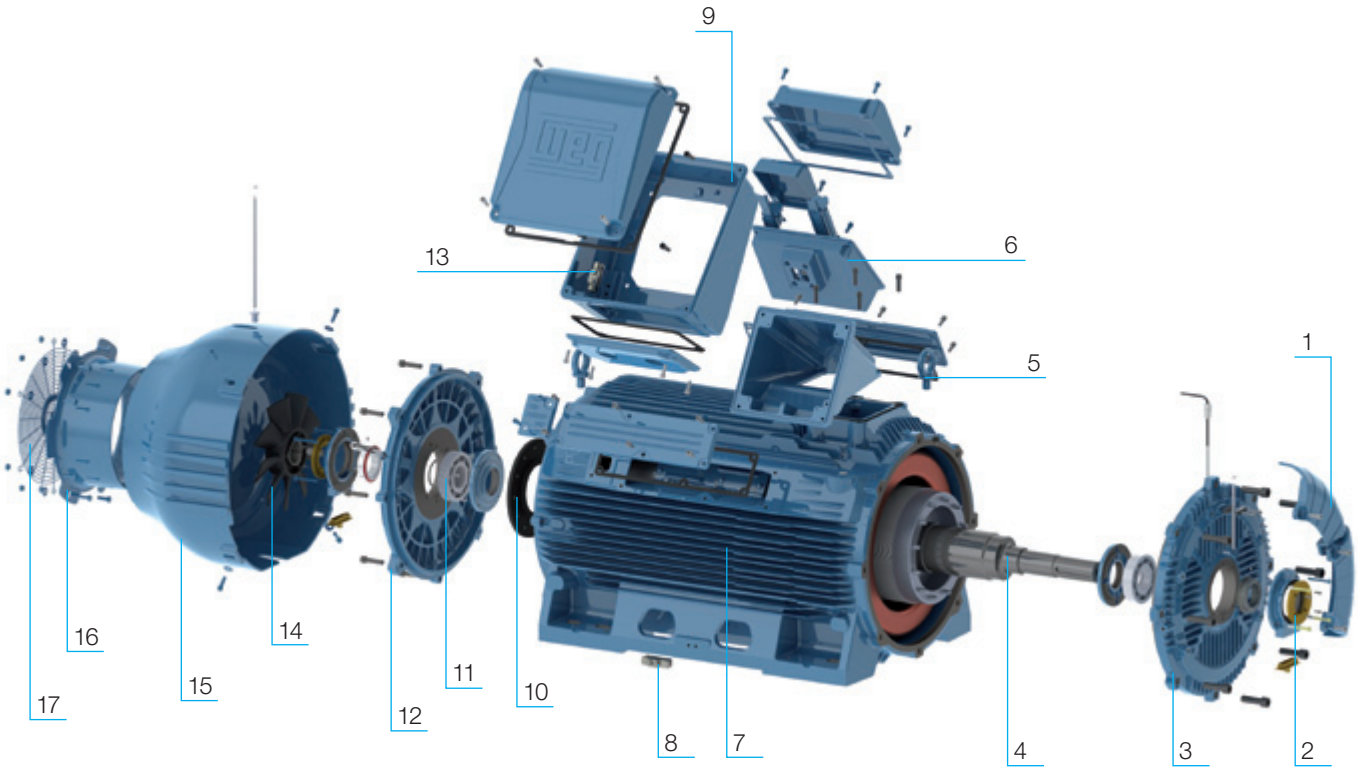




Main Features and Benefits of the W50 Motors

- Compact design
- Modular construction
- Low vibration levels
- High thermal efficiency
- High energy efficiency
- High mechanical strength
- High performance in the most demanding operating conditions
- Low starting current
- Designed for operation with frequency inverter

Visual Index



1	Air baffle
2	Sealing system
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Table 1 - Part description.

Table of Contents

1. Standards

The W50 motors meet the requirements and regulations of the current versions of the following standards:

Standard	Title
IEC EN 60034-1	Rotating electrical machines Part 1: Rating and performance
IEC 60034-2-1	Rotating electrical machines Part 2-1: Standard methods for determining losses and efficiency from tests (excluding machines for traction vehicles)
IEC 60072-1	Dimensions and output series for rotating electrical machines. Part 1: Frame numbers 56 to 400 and flange numbers 55 to 1080
IEC 60072-2	Dimensions and output series for rotating electrical machines. Part 2: Frame numbers 355 to 1000 and flange numbers 1180 to 2360
IEC 60034-8	Rotating electrical machines Part 8: Terminal markings and direction of rotation
IEC 60034-7	Rotating electrical machines Part 7: Classification of types of construction, mounting arrangements and terminal box position (IM Code)
IEC 60034-11	Rotating electrical machines - Part 11: Thermal protection
IEC 60034-6	Rotating electrical machines Part 6: Methods of cooling (IC Code)
IEC 60034-5	Rotating electrical machines Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) - Classification
IEC 60034-14	Rotating electrical machines - Part 14: Mechanical vibration of certain machines with shaft heights 56 mm and higher - Measurement, evaluation and limits of vibration severity
IEC 60034-9	Rotating electrical machines - Part 9: Noise limits
IEC 60034-12	Rotating electrical machines - Part 12: Starting performance of single-speed three-phase cage induction motors
IEC 60038	IEC standard voltages
IEC 60079-0	Explosive atmospheres - Part 0: General requirements
IEC 60079-15	Explosive Atmospheres Part 15: Equipment protection by type of Protection “n”
IEC 62262	Degrees of Protection Provided by Enclosures for Electrical Equipment Against External Mechanical Impacts (IK CODE)

Table 2 - Standards observed in the motor design.

2. Construction Details

The information contained herein refers to the standard mounting features and the most common variants of the W50 line. Motors for special and/or customized application are also available on request. Please, contact the nearest WEG office.

2.1 Frame

Produced in cast iron FC-200, the frames of the W50 motors withstand high mechanical impacts, ensure maximum heat dissipation and high mechanical strength and reduce mechanical vibration even when transmitted by external sources. In addition, fins are distributed to have a greater heat dissipation area in the frontal area, which contributes to a uniform temperature distribution throughout the whole motor and reduces the DE bearing temperature. Thus, this unique fin distribution design ensures excellent thermal performance of the motor.

Figure 1 - W50 Frame.

The motor has solid and integrated cast feet which provide greater strength (see Figure 2).

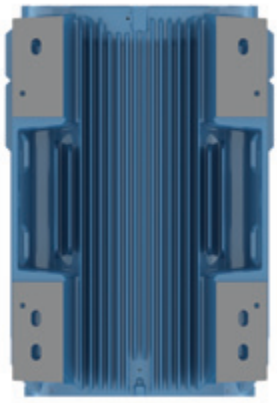


Figure 2 - Solid integrated cast feet ensuring high mechanical strength.

2.2 Eyebolts

To facilitate lifting to the different mounting positions, the W50 motors have multiple points for attaching eyebolts.

- Motors with feet:

Standard: five points for attaching eyebolts.
Optional: nine points for attaching eyebolts (the five standard points plus four additional points - two on each motor foot).

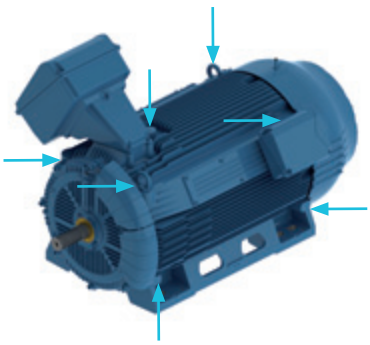


Figure 3 - Eye-bolt fixing points for motors with feet.

Motors with two terminal boxes are provided with three main points for lifting eyebolts (two on the back and one in the center).

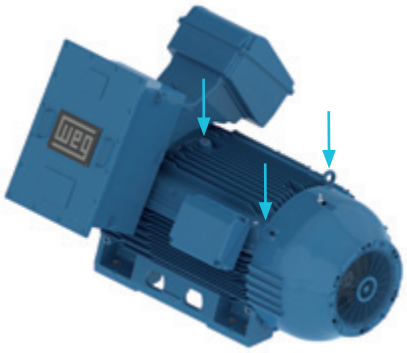


Figure 4 - Eyebolt fixing points for lifting motors with two terminal boxes.

- Footless motor:

Standard: nine eyebolts (five at top side and four at bottom side).
Optional: nine standard eyebolt fixing points plus and one additional eyebolt fixing point located at the bottom side center.

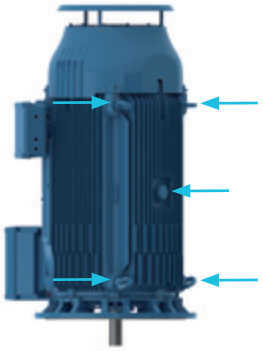


Figure 5 - Eyebolt fixing points for lifting footless motors (at the bottom side).

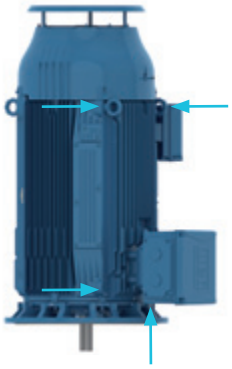


Figure 6 - Eyebolt fixing points for lifting footless motors (at the top side).

Note:

- Horizontal motors:

For lifting of horizontal mounted motors use all eyebolts simultaneously. For this procedure, there are two ways: vertical chains (see Figure 7) and inclined chains (see Figure 8).

Figure 7 - Lifting with vertical chains.

For lifting motors with inclined chains, the maximum inclination angle of the chain during the lifting process should not exceed 30° in relation to the vertical axis. We recommend to use a spreader bar for maintaining the lifting elements (chain or ropes) in vertical position and thus preventing damage to the motor surface.

Figure 8 - Lifting with inclined chains.

- Vertical motors:

For lifting of vertical mounted motors always use the eyebolts mounted at the top side of the motor, diametrically opposite, considering the mounting position (see Figure 9).
In these cases, it is also necessary to use a spreader bar.

Figure 9 - Lifting of vertical motors.

- Motors with two main terminal boxes:

For lifting of motors with two terminal boxes, use always three eyebolts as shown in Figure 10.

Figure 10 - Lifting of motors with two main terminal boxes.

2.3 Grounding Terminals

The W50 motors are fitted with grounding terminals on the frame (see Figure 11) and inside the main terminal box. These terminals can be positioned on the right or left side of the frame and have cross-section from 25 to 185 mm^2.

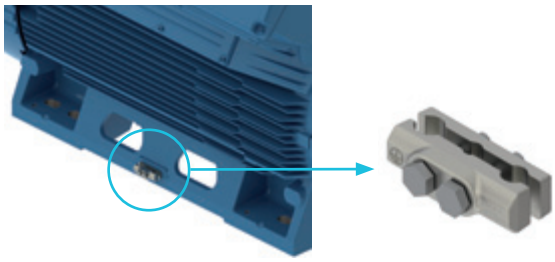


Figure 11 - Detail of the standard grounding terminal for the main terminal box and frame.

2.4 Grounding Brush

The motors can also be supplied with a grounding brush in the drive end as an optional item. For operation with variable frequency inverter, W50 motors are always fitted with shaft grounding brush at motor drive end (see Figure 12) and insulated non-drive end bearing to avoid current flow along the motor shaft, across the bearing and return to the frame thus preventing premature bearing wear and failure due to electric currents flowing through them.

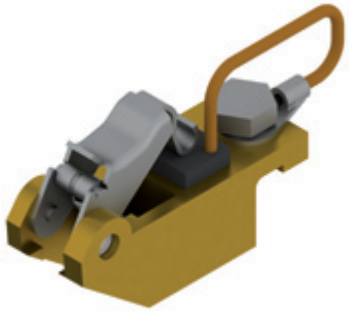


Figure 12 - Shaft grounding brush for bearing.

The motors can optionally be supplied with an AEGIS shaft grounding ring (see Figure 13) installed on the inner bearing cap for external use can be supplied on request.

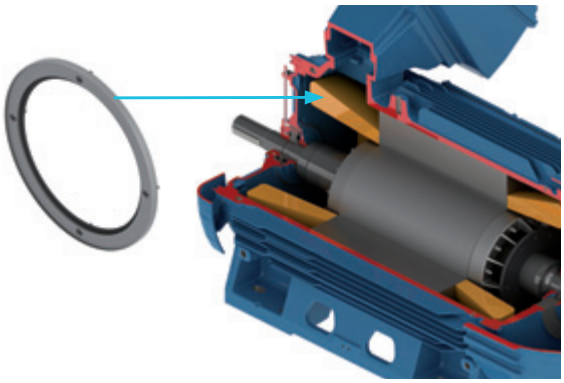


Figure 13 - AEGIS grounding ring.

Note:

- The incorrect specification and/or inadequate use of the grounding devices can cause serious damage to the machine and people involved in the operation of the motor. Before powering up the motor, ensure that it is properly grounded and that all grounding components are in perfect operating conditions.

2.5 Terminal Box

The W50 line has specific terminal boxes for motor power cables and accessory cable connections.

2.5.1 Main Terminal Box

It can be manufactured in cast iron FC-200, the same material used in the frame and endshields, or steel plate, and due to its mounting it can be rotated in steps of 90°.
The main terminal box has been designed for easier and ergonomically handling during cable connection procedures. In addition, the terminal box is mounted on a support on the top of the motor, allowing easy change of the terminal box position (see Figure 14).

Figure 14 - Changing possibilities of the terminal box position.

Low voltage motors are supplied with six cables connected to a terminal block, allowing direct online or star/delta starting.

Figure 15 - Terminal block for low voltage motors with six terminals.

High voltage motors are supplied with three connection bolts and are supplied with terminal block as standard (see Figure 16).

Figure 16 - Terminal block for high voltage motors with three terminals.

Note:

- The tightening torque of the terminals for motors with high and low voltage must comply with the standard DIN 46200.

The terminal box for high voltage motors is provided with a pressure relief device that ensures component integrity and user safety in case of short circuit. In case of activation of the pressure relief device, please contact WEG authorized servicing center . For safety reasons, this device must never be reassembled and never operate the motor without this safety device installed.

On request, the high voltage motors can also be supplied with an additional terminal box mounted at the opposite side of the main terminal box to enclosure the star point (see Figure 17).

High voltage motors can be supplied with surge arrester and/or surge capacitors assembled in specific terminal box (see Section 11. Special accessories).

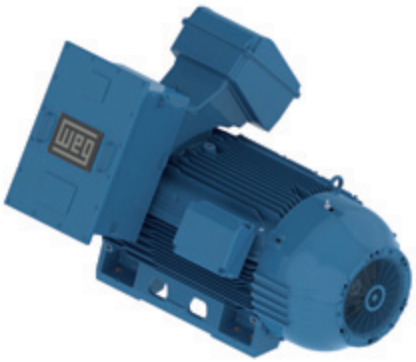


Figure 17 - Motor with access to neutral connection in separated terminal box.

2.5.2 Accessory Terminal Box

The W50 motors have a specific terminal box for connecting accessories. This box is also manufactured in cast iron FC-200 and comprises two compartments (see Figure 18).

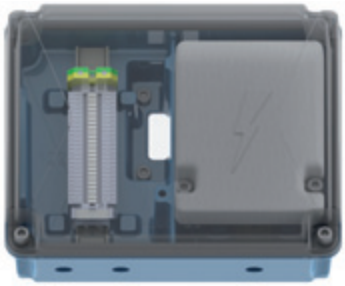


Figure 18 - Accessory terminal box.

2.6 Stator Winding

The stator windings of the W50 motors, regardless of voltage, are supplied with Class F insulation system and Class B temperature rise (80 K). Optionally, the motors can be supplied with Class H insulation system and Class B temperature rise (80 K). Other insulation system combinations can be supplied on request.

To monitor the motor heating, the windings are fitted with two sets of Pt-100 per phase and with a set of space heaters in order to prevent water condensation inside the motor. The space heaters are mounted in the air ducts on both sides of the motor, for easy maintenance.

Figure 19 - Air ducts of the frame for air flow.

Since the lifetime of the motor is influenced by the temperature at which it operates, thus it is important to constantly monitor the winding temperature.

Note:

- The space heaters must always be switched on when the motor is out of service for long periods and switched off when the motor is is running, thereby preventing the deterioration of motor components and possible overheating.

The W50 High Voltage insulation systems are designed with mica tape layers and impregnated with epoxy resin through Vacuum Pressure Impregnation - VPI process and carefully manufactured and tested at factory thus ensuring a end product with high levels of reliability, preventing

contamination of the impregnation varnish and ensuring void-free impregnation of windings. For motors that operate with a non sine wave frequency inverter, insulation systems are reinforced to prevent accelerated aging of insulation (available on request).

2.7 Endshields

To improve heat dissipation and ensure lower operating temperatures on the bearing, the DE endshield is provided with fins uniformly distributed. The endshields are manufactured in cast iron FC-200 and fastened with 8 bolts to ensure maximum rigidity (see Figure 20).

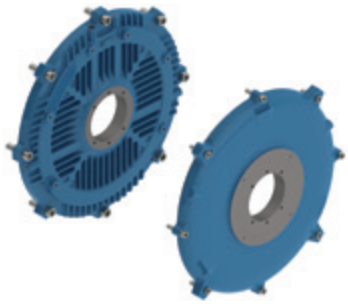


Figure 20 - DE endshield (left) and NDE endshield (right).

Depending on its mounting, the W50 can be provided with flange type “FF”, as shown in Figure 21.

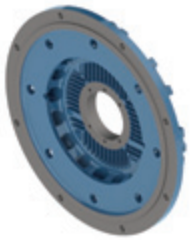


Figure 21 - DE endshield - Flange “FF”.

2.8 Drains

W50 has automatic drain plugs with degree of protection IP66 (see figure 22) which do not require human intervention to open the plug and avoid accumulation of condensed liquids into the motor.

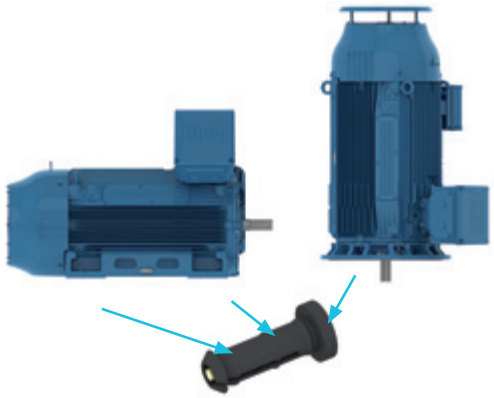


Figure 22 - Positions of automatic drains on the motors of the W50 line mounted in the horizontal and vertical position.

2.9 Fan Cover

The fan covers are built in cast iron FC-200 (see Figure 23), have an aerodynamic design, features high mechanical resistance to loads and impacts which allows their application in environments with risk of mechanical impact up to 5 Joules (IK08 according to standard IEC 62262).
For motors with sleeve bearings, the fan cover is made of steel plate with the same features as the cast iron version.

Figure 23 - Fan cover manufactured in cast iron FC-200.

Thanks to the new baffle design along with the new arrangement of the frame fins, the W50 ensures optimal air flow and air speed over the frame. The shape of the baffle ensures increased efficiency of the ventilation system, which improves the thermal performance and efficiency of the motor. The unique mounting system of the grid and internal baffle (see Figure 24) ensures low noise levels - even lower than noise levels stablished by the standardards.

Figure 24 - Mounting system that ensures low noise levels.

2.10 Air Baffle

The W50 also has a pair of air baffles made of cast iron on the DE bearing. It was designed in order to guarantee a continuous and uniform airflow over the bearing housing, which significantly lowers its temperature and consequently increases relubrication intervals and bearing life (see Figure 25). Motors with sleeve bearings are supplied with two pairs of air baffles (see Figure 26).

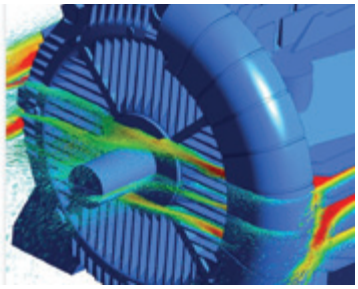


Figure 25 - Representation of the air flow over the DE bearing.

Figure 26 - Two pairs of air baffles for motors with sleeve bearings.

It is noteworthy to mention that for proper motor operation air inlets for motor ventilation are not blocked and that the space surrounding the equipment is enough to keep the air temperature at the baffle inlet below the maximum temperature indicated on the motor main nameplate. For motors installed outdoors ensure that ventilation openings are not blocked and a minimum clearance of 1/4 of the baffle diameter is maintained from the walls to ensure free airflow for the ventilation system. For indoor installations, besides the minimum distance from walls, the air temperature must be checked at the air inlet of the ventilation system to prevent motor overheating.
Motors installed outdoors or in vertical position require the use of additional shelter to protect them against the ingress of rainwater and/or solid particles, for instance the use of a drip cover.

Note:

- The mounting features of the fan cover must not be changed, because they are designed to ensure maximum efficiency of the fans.

2.11 Nameplate

The motors can be supplied with three types of nameplate: main, additional and warning nameplate. All nameplates are made of AISI 304 stainless steel and the main and additional plates are laser engraved. Figure 27 shows the location of the nameplates on the W50 motor.

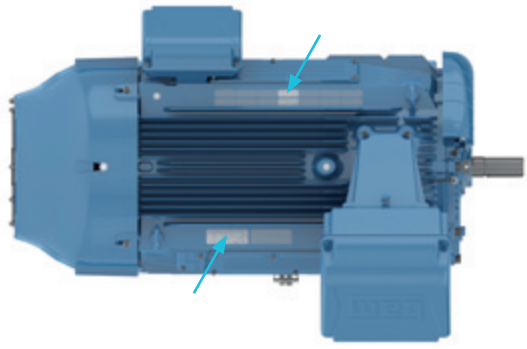


Figure 27 - Location of the nameplates on the electric motor.

2.11.1 Main Nameplate

The main nameplate provides information describing the mounting features and motor performance. It also iprovides the motor serial number and its year of manufacture. Figure 28 shows the layout of the nameplate on the W50 motor.

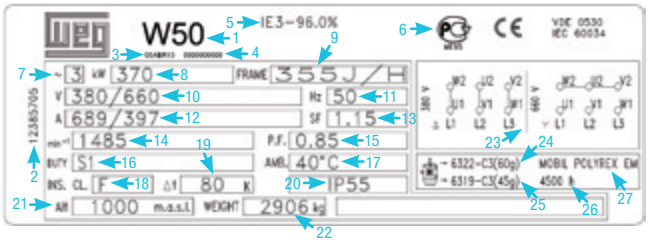


Figure 28 - Main nameplate of the motor.

1	Motor line
2	Motor code
3	Manufacturing date
4	Serial number
5	Efficiency level
6	Certification
7	Number of phases
8	Output power
9	Frame model
10	Rated voltage
11	Frequency
12	Rated current
13	Duty factor
14	Speed
15	Power factor
16	Duty cycle
17	Ambient temperature
18	Insulation class
19	Temperature rise of the windings
20	Degree of protection
21	Altitude
22	Weight
23	Wiring diagram
24	DE bearing and grease quantity
25	NDE bearing and grease quantity
26	Bearing´s relubrication interval (in hours)
27	Grease type used for bearings

Table 3 - Description of the items on the motor main nameplate.

2.11.2 Additional Nameplate

To indicate the available accessories, the W50 motors are supplied with additional nameplates that contain informations on temperature sensors (see Figures 29 and 30), space heaters (see Figure 31), and other accessories supplied on customer request. If required, these nameplates can be used to show the TAG codes specific to the motor.

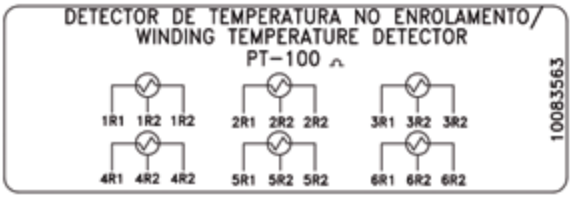


Figure 29 - Additional nameplate for winding temperature detectors (Pt-100).

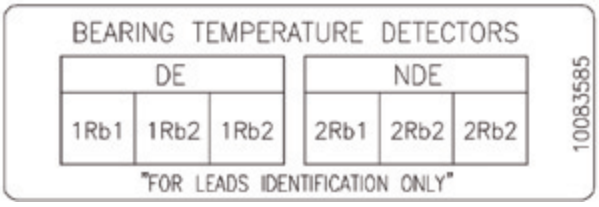


Figure 30 - Additional nameplate of the temperature sensor (Pt-100) for the bearings.

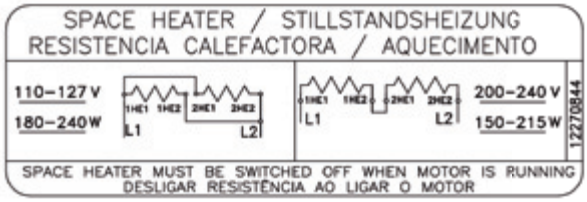


Figure 31 - Additional nameplate for the space heater.

Note:

- When motor is fitted with dual voltage space heaters, WEG supplies the motor connection set for 127 V. If required to connect to 220 V, the wiring diagram must be changed as shown on the additional nameplate of the space heater.

2.11.3 Warning Plate

Motors with rated voltage above 1 kV are supplied with a warning nameplate (see Figure 32), indicating the presence of high voltage on the motor. Never touch any energized circuits or rotating parts of the motor. Maintenance, installation and any interventions must be performed by qualified staff with appropriate tools only. For more details contact WEG technical support.

Figure 32 - Warning plate for motors above 1 kV.

3. Ventilation System/Noise Level/ Vibration

3.1 Ventilation System

The motors of the W50 line comply with the specification of Totally Enclosed Fan Cooled motors (TEFC - IC-411) according to NEMA MG-1 Part 6.
The optional version with forced ventilation (IC 416) can also be provided. On request, WEG can supply non-ventilated (TENV) and Air Over (TEAO) versions. Further information on the IC 416 option can be found in item 9.2 Operation with Frequency Inverter.

3.1.1 Fans

With an innovative ventilation system, W50 motors have a uniform distribution of internal temperature. This system produces a pressure difference between the drive end and non-drive end of the motor, resulting in an air flow through the rotor cooling channels (see Figure 33). The internal ventilation system results in an homogeneous temperature distribution along the stator, and also helps to reduce the bearing temperature levels.
The internal ventilation system adopted for the W50 motors is simple and compact and provides the required air flow while increasing the cooling efficiency and reducing the vibration levels.

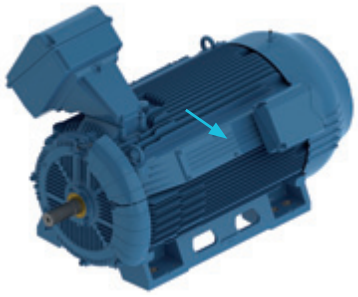


Figure 33 - Airflow channels in the motor frame.

The W50 2P motors are fitted with axial fans (figure 36) and with 4 or more poles are fitted with radial fans, ensuring low noise levels and high ventilation efficiency.
Made of cast iron FC-200, the fans are unidirectional for 2-pole motors and bidirectional for four or more poles.
For 2 pole motors, the direction of rotation must be specified by the customer. Aluminum fans can also be supplied on request.

Figure 34 - Radial fan with straight blades..

Figure 35 - Axial fan with inclined blades.

3.2 Noise Level

Table below shows the noise levels of the W50 motor plattform. The data refers to motors operating at 50 Hz and 60 Hz with fan covers made of cast iron. For lower speeds, please contact WEG.

Frame	Sound pressure level dB(A) - 50 Hz				Sound pressure level dB(A) - 60 Hz			
	2P	4P	6P	8P	2P	4P	6P	8P
315 H/G	75	75	73	71	79	79	77	75
355 J/H	78	78			82	82		
400 L/K 400 J/H			77	75			81	79
450 L/K 450 J/H								

Table 4 - Sound pressure level for motors at 50 Hz and 60 Hz with fan cover made of cast iron.

The sound pressure levels shown in the tables above are valid for motors operating with no load and sine-wave power supply. Under load, IEC 60034-9 specifies a sound pressure level increase according to Table 5.

Height of the shaft end - H (mm)	2P	4P	6P	8P
H = 315	2	3	5	6
355 ≤ H		2	4	5

Table 5 - Maximum expected increase of the sound pressure level for motors operated with load.

Note:

- The sound pressure level increase for motors driven by frequency inverter that depends on the switching frequency of the inverter, may reach up to maximum 11 dB (A) according to IEC 60034-17 and IEC 60034-25.

3.3 Vibration

The vibration of an electrical machine is directly related to its installation conditions. For this reason, it is extremely important that the customer ensures a sturdy base and the required dimensional tolerances.
To prevent equipment damage, vibration levels should be monitored regularly and any abnormal behavior must be immediately reported to the nearest authorized repair shop and/or to WEG. Motors with rolling bearings are highly sensitive to vibrations, and can suffer premature wear if exposed to vibrations above the acceptable limits.
It is recommended that vibration measurements be always performed before and after any maintenance or intervention on the equipment. Whenever possible, the vibrations generated only by the motor must be evaluated by no-load tests, following the procedures described in IEC-60034-14.

According to Table 6, the limits of maximum vibration magnitude in displacement, velocity and acceleration defined by IEC 60034-14 for motors operating at no-load are classified into vibration grade A and B.

Vibration grade	Mounting	Displacement (µm)	Velocity (mm/s)	Acceleration (m/s^2)
A	Free suspension	45	2.8	4.4
	Rigid mounting	37	2.3	3.6
B	Free suspension	29	1.8	2.8
	Rigid mounting	24	1.5	2.4

Table 6 - Limits of maximum vibration magnitude in displacement, velocity and acceleration according to the IEC- 60034-14.

When no special vibration requirements are specified in the Purchase Order, motors will be supplied in conformance with vibration grade A, while motors in conformance with vibration grade B will be supplied only on request. All rotors of the W50 motors are dynamically balanced with a half key and, as standard, are designed to vibration grade A.
According to IEC- 60034-14, the standard motors are balanced to Grade G2.5. For special and lower vibration levels the balance quality grade is G2.5.
For vibration monitoring, the D-endshield of the W50 motors has three M8 threaded holes where vibration sensors can be fitted. Optionally, these holes can be supplied with a threaded adapter for fitting the SPM vibration sensor (see Figure 37).

Figure 36 - SPM Sensors.

Figure 37 - Threaded adapter for vibration measurement.

The frames also have flat areas for mounting of vibration sensors at the motor non-drive end. On request, non-drive end shields can be supplied with threaded holes for sensor mounting. Figure below shows the measuring point locations (see Figure 38). On request, the vibration sensors can be supplied with the motor.

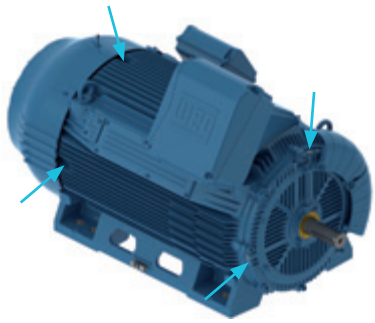


Figure 38 - Location of vibration measuring points.

3.3.1 Shaft Relative Vibration Limits

For machines with sleeve bearings with speed over 1,200 rpm and at rated power over 1,000 kW, IEC 60034-14 recommends relative shaft vibration measurements (see Table 7).
Sensor readings may be affected by mechanical and magnetic anomalies of the shaft, commonly referred to as runout.

Vibration grade	Speed range	Maximum vibration (µm)	Runout (µm) (peak-to-peak)
Grade A	>1,800	65	16
	≤1,800	90	23
Grade B	>1,800	50	12.5
	≤1,800	65	16

Table 7 - Maximum relative shaft displacement.

4. Shaft/Bearings/Stresses

4.1 Shaft

The shafts of the W50 motors comply with IEC 60072 and undergo several numerical analyses until reaching the final dimensioning. Among the evaluation steps are: calculation of fatigue considering the stress concentration, torsion, bending and traction-compression efforts, stress and deformation analysis, torsional and modal analysis.
In order to facilitate the maintenance and the coupling of loads, all motors have the shaft with threaded center hole. The standard shaft material is AISI 4140 steel, and supplied with key type “A” according to ISO 2491. On request, WEG can also supply double-end shaft motors, shaft end with special dimensions, and shafts made of other materials. The dimensions for the shaft and key can be found in section 15. Mechanical Data.

4.2 Bearings

The standard motors are supplied with open ball bearings with C3 clearance and lubricated with grease. On request, motors with ball bearings can be supplied with C4 clearance.
All motors are supplied with Pt-100 temperature sensors in the windings as standard thus ensuring an efficient method for continuous temperature monitoring during operation.
Standard motors are supplied with taconite labyrinth seals and, as an option, they can be supplied with INPRO / SEAL or labyrinth with Teflon Seal. Figure 39 shows the bearing construction form.

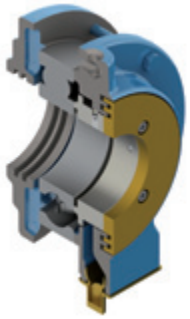


Figure 39 - Bearing construction form.

The vertical motors, for normal thrust loads can be supplied with ball bearings or angular contact ball bearings at the drive side, considering frame size and speed. This bearing configuration ensures optimum operating conditions for the motor in different applications and also prevents possible coupling problem caused due to thermal expansion.
The rated bearing lifetime, L10h, for direct coupling of the W50 line motors is 100,000 hours and for other operating conditions the bearing lifetime, L10h, is 40,000 hours.
Different bearing lifetime L10h can be evaluated on request.
The rolling bearing lifetime depends on the type and size of the bearing, the radial and axial loads they are subject, the operating conditions, the speed and grease life. Thus, its lifetime is closely related to its correct use, maintenance and lubrication. When the recommended amount of grease and lubrication intervals are respected, the bearings can reach the lifetime aforementioned.

Note:

- The bearing lifetime, L10h, in terms of operating hour, is the life that 90% of bearings is reached or even exceeded when motors are operated in compliance with the data provided in this catalog.

Table 8 lists the standard rolling bearings for different configurations of the W50 line.

	Frame	Number of poles	DE	NDE
Horizontal mounting	315 H/G	2	6314 C3	6314 C3
		4 - 8	6320 C3	6316 C3
	355 J/H	2	6314 C3	6314 C3
		4 - 8	6322 C3	6319 C3
	400 L/K and 400 J/H	2	6218 C3	6218 C3
		4 - 8	6324 C3	6319 C3
	450 L/K and 450 J/H	2	6220 C3	6220 C3
		4 - 8	6328 C3	6322 C3
Vertical mounting Normal thrust	315 H/G	2	7314 C3	6314 C3
		4 - 8	6320 C3	6316 C3
	355 J/H	2	7314 C3	6314 C3
		4 - 8	6322 C3	6319 C3
	400 L/K and 400 J/H	2	7218 C3	6218 C3
		4 - 8	7324 C3	6319 C3
	450 L/K and 450 J/H	2	7220 C3	6220 C3
		4 - 8	7328 C3	6322 C3

Table 8 - Standard rolling bearings per frame size.

Optionally, motors with horizontal mounting for applications with high radial loads can be supplied with roller bearings of the NU series, according to Table 9.

Frame	Number of poles	Rolling bearing
		DE
315 H/G	4 - 8	NU320 C3
355 J/H	4 - 8	NU322 C3
400 L/K and 400 J/H	4 - 8	NU324 C3
450 L/K and 450 J/H	4 - 8	NU328 C3

Table 9 - Optional roller bearings of the NU series.

The W50 motors can also be supplied with sleeve bearings with lateral flange and natural cooling (see Figure 40). This option ensures lower maintenance and longer bearing life in non-heavy duty applications with direct coupling. Depending on the customer requirements, other configurations can be supplied on request.

Figure 40 - Sleeve bearing.

Table 10 lists the standard bearings for motors with sleeve bearings.

	Frame	Number of poles	DE	NDE
Horizontal mounting with sleeve bearings	315 H/G	2	9-80	9-80
		4 - 8	9-90	9-90
	355 J/H	2	9-80	9-80
		4 - 8	9-100	9-100
	400 L/K and 400 J/H	2	9-80	9-80
		4 - 8	11-110	11-110
	450 L/K and 450 J/H	2	9-80	9-80
		4 - 8	11-125	11-125

Table 10 - Standard bearings per frame for motors with sleeve bearing.

4.2.1 Shaft Locking Device

The W50 motors are fitted with a mechanical shaft locking device to prevent damage to the rotor and bearings during transportation (see Figures 41, 42 and 43). This locking device should only be removed right before installation and stored in a safe location for future transportation of the motor.

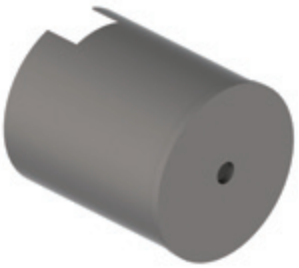


Figure 41 - Shaft locking device for motors with rolling bearing.

Figure 42 - Shaft locking device for motors with special bearing.

Figure 43 - Shaft locking device for motors with sleeve bearing.

4.2.2 Insulated Bearing

In order to avoid bearing damage caused by electrical discharges generated inside the bearings, the W50 motors are fitted as standard with insulated NDE bearing (Figure 44). Currents flowing through the bearing have the potential of creating premature failure of theses bearings, accelerating the degration og the lubricant and of the bearing rolling elements.

For all motors driven by frequency inverter, the electrical insulation of the NDE bearing and grounding between shaft and frame through grounding brush at drive end is mandatory.

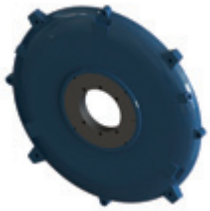


Figure 44 - Insulated NDE endshield.

Horizontal motors with sleeve bearings, when required, both endshields may be supplied with insulation. Vertical motors with high thrust loads are also supplied with insulated DE bearing. For other configurations, contact WEG.

4.2.3 Lubrication

Bearing Lubrication

The W50 motors are fitted with a lubrication system with grease nipples on the DE and ND endshields, and a grease outlet drawer system for removing the old grease.
The amount of grease and lubrication intervals are informed on the motor nameplate, and are also specified in Table 11.

	Frame	Number of poles	DE bearing	Grease (g)	50 Hz (h)	60 Hz (h)	NDE bearing	Grease (g)	50 Hz (h)	60 Hz (h)
Horizontal mounting- ball bearings	315 H/G	2	6314	27	4,500	3,500	6314	27	4,500	3,500
		4 - 8	6320	50		4,500	6316	34		4,500
	355 J/H	2	6314	27		3,500	6314	27		3,500
		4 - 8	6322	60		4,500	6319	45		4,500
	400 L/K and 400 J/H	2	6218	24	3,800	2,500	6218	24	3,800	1,800
		4 - 8	6324	72	4,500	4,500	6319	45	4,500	4,500
	450 L/K and 450 J/H	2	6220	31	3,000	2,000	6220	31	3,000	2,000
		4	6328	93	4,500	3,300	6322	60	4,500	4,500
		6 - 8				4,500				
Vertical mounting- ball bearings	315 H/G	2	7314	27	2,500	1,700	6314	27	2,500	1,700
		4	6320	50	4,200	3,200	6316	34	4,500	4,500
		6 - 8			4,500	4,500				
	355 J/H	2	7314	27	2,500	1,700	6314	27	2,500	1,700
		4	6322	60	3,600	2,700	6319	45	4,500	3,600
		6 - 8			4,500	4,500				4,500
	400 L/K and 400 J/H	2	7218	24	2,000	1,300	6218	24	2,000	1,300
		4	7324	72	3,200	2,300	6319	45	4,500	3,600
		6			4,500	4,300				4,500
		8				4,500				
	450 L/K and 450 J/H	2	7220	31	1,500	1,000	6220	31	1,500	1,000
		4	7328	93	2,400	1,700	6322	60	3,500	2,700
		6			4,100	3,500			4,500	4,500
		8			4,500	4,500				
Horizontal mounting- roller bearings	315 H/G	4	NU320	50	4,300	2,900	6316	34		
		6 -8			4,500	4,500				
	355 J/H	4	NU322	60	3,500	2,200	6319	45		
		6 - 8			4,500	4,500				
	400 L/K and 400 J/H	4	NU324	72	2,900	1,800				
		6 - 8			4,500	4,500				
	450 L/K and 450 J/H	4	NU328	93	2,000	1,400	6322	60		
		6			4,500	3,200				
		8				4,500				

Table 11 - Relubrication intervals and amount of grease for grease lubricated bearings.

It is extremely important to follow the lubrication intervals specified on the motor nameplate. An excessive or insufficient lubrication may increase the bearing temperature during operation, resulting in premature wear of the bearings and consequent reduction of their lifetime.

Table 12 specifies the standard type of grease for the motors and indicates some properties of the lubricating grease. Besides the greases already mentioned in the table, there are others that are compatible with the design of the W50 and can also be used. For these cases refer to WEG respective Installation, Operation and Maintenance Manual.

Frame	Number of poles	Lubricant	Lubricant specification
315 H/G	2 - 8	Mobil Polyrex EM	Grease with mineral oil, polyurea-based thickener, ISO VG 115
355 J/H	2 - 8		
400 L/K and 400 J/H	2 - 8		
450 L/K and 450 J/H	2 - 8		

Table 12 - Typical properties of the standard lubricant.

Note:

- For operation of the motors under other than normal operating conditions, such as: ambient temperature above 40 °C, altitude higher than 1,000 m above sea level and axial and/or radial load above the specified in the tables in this catalog, please refer to WEG.
- The use of greases not recommended by WEG or in different amounts than specified above may void the product warranty.

Motors with ball bearings at the drive end (DE) and at the non-drive end (NDE) are fitted with bearings caps and locating bearing at DE and non-locating bearing at NDE with preload washer. When motor is fitted with roller bearing at the drive end, special bearing caps are assembled at the non-drive end where the locating bearing is assembled.

Sleeve Bearing Lubrication

Depending on the application the W50 motor can be supplied with sleeve bearings available on request. This type of bearing requires less maintenance ensures longer lifetime and relubrication intervals.
Table 13 provides key information about lubricants for sleeve bearings.

	No. of poles	Frame	Bearing	Relubrication interval (h) 50 and 60 Hz	Amount of oil (L)	Lubricant	Lubricant specification
Mounting - sleeve bearings	2	315 H/G	9-80	8,000	2.8	FUCHS Renolin DTA 10	ISO VG 32 mineral oil with antifoaming agents and antioxidant additives
		355 J/H					
		400 L/K and 400 J/H					
		450 L/K and 450 J/H					
	4 - 8	315 H/G	9-90			FUCHS Renolin DTA 15	ISO VG 32 mineral oil with antifoaming agents and antioxidant additives
		355 J/H	9-100				
		400 L/K and 400 J/H	11-110		4.7		
		450 L/K and 450 J/H	11-125				

Table 13 - Lubrication oil used in sleeve bearings.

4.3 Maximum Radial and Axial Loads

The tables below show the maximum allowable radial and axial loads for the W50 motors. The values of the maximum load were calculated considering a L10h bearing lifetime of 40,000 h. The maximum radial load values consider the axial load equal to zero and the maximum axial load values consider the radial load equal to zero. For applications involving simultaeneously axial and radial load, refer to WEG on bearing lifetime.

To determine the maximum allowable radial and axial loads on the motor shaft the following factors must be considered:

- Regular operating conditions.
- Shaft material: AISI 4140.
- 2-pole motors: parabolic torque load.
- 4, 6 and 8-pole motors: constant torque load.
- The values consider the application of a standard bearing for horizontal mounted motors.

4.3.1 Radial Loads

The values shown in Tables 14 and 15 for the radial loads refer to the force applied to the center of the shaft end, L/2, and the end of the length of the shaft end,(Figure 45).

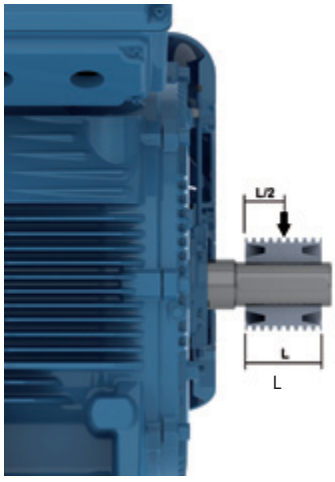


Figure 45 - Radial load applied to the shaft end.

Radial Load - Ball Bearing

Radial load - 50 Hz - Fr (kN)								
Frame	2P		4P		6P		8P	
	L/2	L	L/2	L	L/2	L	L/2	L
315 H/G	3	3	7	6	9	8	10	9
355 J/H		2	8	7				8
400 L/K and 400 J/H	-		6	5	7	7	8	
450 L/K and 450 J/H			7	7	9	8	9	9

Table 14 - Maximum allowable radial loads at 50 Hz for ball bearings.

Radial load - 60 Hz - Fr (kN)								
Frame	2P		4P		6P		8P	
	L/2	L	L/2	L	L/2	L	L/2	L
315 H/G	2.5	2.5	7	6	8	7	9	8
355 J/H		2						
400 L/K and 400 J/H	-		6.5		7	6	8	7
450 L/K and 450 J/H			7					

Table 15 - Maximum allowable radial loads at 60 Hz for ball bearings.

Radial Load - Roller Bearing

Radial load - 50 Hz - Fr (kN)						
Frame	4P		6P		8P	
	L/2	L	L/2	L	L/2	L
315 H/G	29	15	28	14	28	12
355 J/H	30		21	8	21	8
400 L/K and 400 J/H		12	19		19	
450 L/K and 450 J/H	34	13	34	13	34	13

Table 16 - Maximum allowable radial loads at 50 Hz for roller bearings.

Radial load - 60 Hz - Fr (kN)						
Frame	4P		6P		8P	
	L/2	L	L/2	L	L/2	L
315 H/G	27	18	29	17	29	14
355 J/H	23	14	21	8	25	10
400 L/K and 400 J/H	26	11			29	11
450 L/K and 450 J/H	33	15	27	10	24	9

Table 17 - Maximum allowable radial loads at 60 Hz for roller bearings.

Note:

- Roller bearings require a minimum radial load (preload) to ensure proper operation. This type of bearing is not recommended for applications with direct coupling.

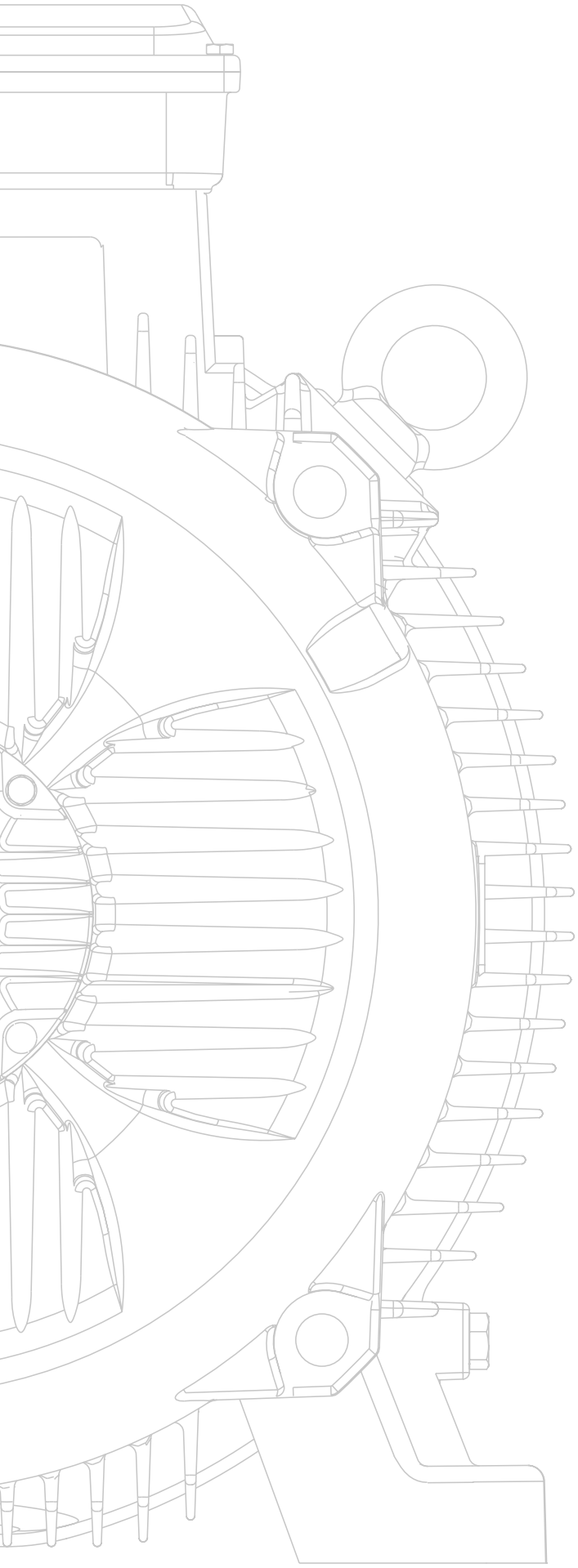
4.3.2 Axial Loads

Axial Loads for Horizontal Mounted Motors

The values shown in Table 18 indicate the maximum allowable values for axial load on the shaft end for horizontal mounted motors fitted with ball bearing.

Frame	Number of poles	Momentary traction or compression (kN)
315 H/G	2	2
	4	5
	6	6
	8	7
355 J/H	2	2
	4	6
	6	7
	8	7.5
400 L/K and 400 J/H	2	1.5
	4	6
	6	7
	8	7.5
450 L/K and 450 J/H	2	1.5
	4	5
	6	6
	8	7

Table 18 - Maximum allowable axial load for horizontal mounted motors.



Axial Loads for Vertical mounted motors

The values shown in Table 19 indicate the maximum allowable axial load on the shaft end for vertical mounted motors with normal thrust. The table considers DE bearing with angular contact.

Frame	Number of poles	Thrust (kN)	Momentary compression (kN)
315 H/G	2	On request	
	4	8	5
	6		6
	8		
355 J/H	2	On request	
	4	9	6
	6		7
	8		
400 L/K and 400 J/H	2	On request	
	4	10	7
	6		7.5
	8		
450 L/K and 450 J/H	2	On request	
	4	8	7
	6		
	8		

Table 19 - Maximum allowable axial load for vertical motors with normal thrust.

5. Mounting Forms

The standard motors are supplied in the B3 - mounting (see Figure 46), with the terminal box on the left side of the frame, looking at the non-drive end of the motor.
The mounting designation for the W50 motors designation the IEC 60034-7. Different mounting can be supplied, as shown in table 20.

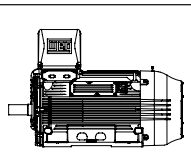
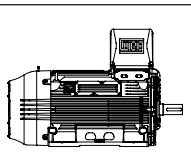
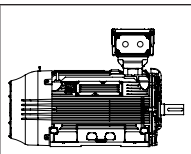
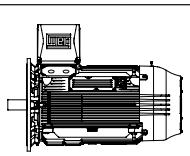
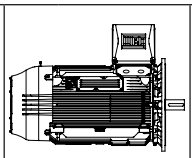
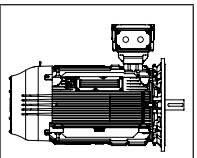
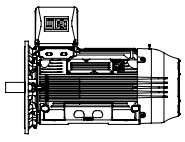
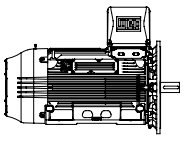
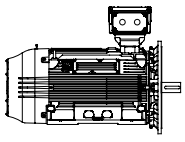
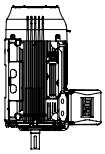
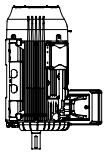
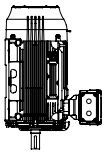
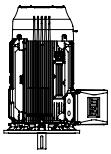
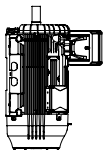
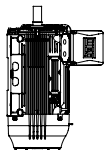
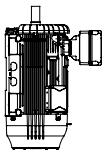
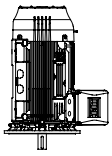
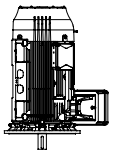
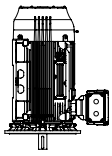
Mounting								
	WEG Reference	B3R(E)	B3L(D)	B3T	B5R(E)	B5L(D)	B5T	
Details	Frame	With feet	With feet		Without feet	Without feet		
	Shaft end	Left	Right		Left	Right		
	Fixation	Base or rails	Base or rails		FF flange	FF flange		
Mounting								
	WEG Reference	B35R(E)	B35L(D)	B35T	V5L(D)	V5R(E)	V5T	V1L(D)
Details	Frame	With feet	With feet		With feet			Without feet
	Shaft end	Left	Right		Downwards			Downwards
	Fixation	Base or FF flange	Base or FF flange		Wall			FF flange
Mounting								
	WEG Reference	V6L(D)	V6R(E)	V6T	V15L(D)	V15R(E)	V15T	
Details	Frame	With feet			With feet			
	Shaft end	Upwards			Downwards			
	Fixation	Wall			Wall or FF flange			

Table 20 - Mountings.

Figure 46 - B3R(E) mounting.

6. Degree of protection/Bearing sealing/Painting

6.1 Degree of Protection

Standard IEC 60034-5 defines the degrees of protection of electrical equipment by means of the characteristic letters IP, followed by two characteristic numerals. The W50 motors are supplied with degree of protection IP55.

First characteristic numeral	
1st charact. numeral	Definition
0	No-protected machine
1	Machine protected against solid objects greater than 50 mm
2	Machine protected against solid objects greater than 12 mm
3	Machine protected against solid objects greater than 2,5 mm
4	Machine protected against solid objects greater than 1,0 mm
5	Dust-protected machine
6	Dust-tight machine

Table 21 - First characteristic numeral indicates the degree of protection against the ingress of solid objects and accidental or inadvertent contact.

Second characteristic numeral	
2nd charact. numeral	Definition
0	No-protected machine
1	Machine protected against dripping water
2	Machine protected against dripping water when tilted up to 15º
3	Water falling as a spray at any angle up to 60º from the vertical
4	Water splashing against the machine from any direction
5	Water protected by nozzle against the enclosure from any direction
6	Water from heavy seas or water projected in powerful jets
7	Machine protected against the effects of immersion
8	Machine protected against the effects of continuous submersion

Table 22 - Second characteristic numeral indicates the degree of protection against the ingress of water in the machine.

The W50 motors can also be supplied with higher degree of protection, as indicated below:

- IPW55 for increased degree of protection for outdoor installation.
- IP56 and IPW56 for increased degree of protection against water.
- IP65 and IPW65 for increased degree of protection against dust.
- IP66 and IPW66 for iincreased degree of protection against dust and water.

Note:

- Letter W means that the motor can be operated in weathering.

6.2 Bearing Sealing

The bearing sealing used on the endshields of the motor is the taconite labyrinth, which ensures the degree of protection IP55 for the motor frame according to IEC 60034-5.
This sealing system protects the motor against the ingress of dust and water into the frame present in the environment.

6.3 Painting

The motors can be applied in severe industrial environments, in sheltered locations or outdoors, in the presence of SO_2, steams and solid contaminants, high humidity indexes, alkali and solvent splashes. The painting plan of the motors ensures a minimum of 1,000 hours of corrosion resistance in the test by salt spray chamber according to ASTM B117-03 and corrosion category C5 (I), according to ISO 12944-2.

6.3.1 Internal Anti Corrosive Painting

High humidity indexes can result in premature insulation system deterioration which is the main component that ensures the motor lifetime. Motors applied in environments with relative air humidity of about 95% do not require additional protections beyond the space heater to prevent moisture condensation inside the motor.
However, for use in environments with humidity inexes above 95%, it is recommended to apply an epoxy coating on the internal parts of the motor, also known as tropicalized painting.

7. Voltage/Frequency

According to IEC 60034-1, the combinations of voltage and frequency variations are classified as Zone A or Zone B (see Figure 47).

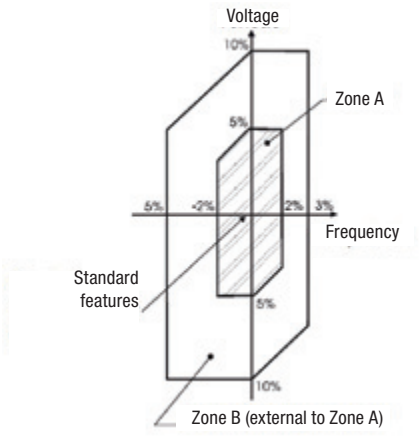


Figure 47 - Limits of voltage and frequency variations under operation.

A motor must be capable of performing its main function continuously at Zone A, however it may not develop completely its performance characteristics at rated voltage and frequency showing few deviations. Temperature rises can be higher than those at rated voltage and frequency.
A motor must be capable of performing its main function at Zone B, however it may present higher deviations than those of Zone A in reference to performance characteristics at rated voltage and frequency. Temperature rises can be higher than those at rated voltage and frequency and probably higher than those of Zone A. The extended operation at Zone B is not recommended.

8. Environment

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

- Ambient temperature range from -30°C to +40°C.
- Altitudes not exceeding 1.000 masl. When the operating temperatures and altitudes differ from those indicated above, you must apply the derating factors indicated in table 21 to determine the useful power output (Pmax).

Pmax = Pnom x Derating Factor.

T (°C)	Altitude (m)								
	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000
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 23 - Derating factor considering altitude and ambient temperature.

9. Operation Characteristics

During installation and any intervention on the machine, all recommendations for handling, lifting and maintenance must be observed.

9.1 Thermal Protection

In order to monitor the operating condition of the motor, all the W50 motors are fitted with temperature sensors in the windings and on the bearings.
In its standard version, the motors are fitted with two resistance temperature detector (Pt-100) with three wires per phase and one resistance temperature detector (Pt-100) per bearing (see Figure 48).
Motors with sleeve bearing use Pt-100 with connection head (see Figure 49) fixed directly to the bearing. These devices generally have three wires, but they can be supplied with 2, 4, 6 (duplex) and 8 cables (duplex), and can be supplied with with ATEX or Ex certifications.

Figure 48 - Pt-100.

Figure 49 - Pt-100 with connection head.

The W50 motors can also be supplied with other accessories:

- Thermostat: bimetallic thermal protectors with silver contacts, NC type (normally closed), which open when predetermined temperature rise is reached.

  When the activation temperature of the bimetal thermal protector decreases, the thermostat will return to its original position instantaneously allowing to close the contact and the consequent restart of the motor. The thermostats are series connected to the motor coil, and thus can be used for switching off the motor. A second set of bimetal thermal protectors can be used for the alarm, however in this case it must be connected to a specific alarm circuit.
- PTC Thermistors: increase their resistance very fast with temperature increase. The sudden change in resistance interrupts the current in PTC, activates an output relay, which turns off the main circuit. (see Figure 50).

Figure 50 - PTC Thermistor.

The thermistors have reduced size, do not have mechanical wear, and provide faster response when compared to other temperature sensors. However they do not allow continuous monitoring of the motor heating process. Thermistors with their electronic circuit controls ensure complete protection against overheating caused by phase-fault, overload, under/overvoltages or frequent reversals of direction of rotation or on/off cycles.

9.2 Operation with Frequency Inverter

The W50 motors have a design suitable for applications with variable speed. The standard motor is designed for sine wave filter inverter operation, otherwise a motor with reinforced insulation must be supplied.
All W50 motors have rigid shafts, avoiding the need of skipping frequencies on the inverter in the operating range; however, for speeds above the catalog limits, contact WEG.
The W50 motors can be supplied for high speed version (up to 5,000 rpm), also on request.

9.2.1 Influence of the Frequency Inverter on Temperature Rise of the Motor

The induction motor may present a higher temperature increase when fed by a frequency inverter, than when fed with sine wave voltage. This overtemperature rise is due to the combination of two factors: the increase of losses on the motor as a function of the harmonic components of the PWM voltage supplied by the inverter, and the reduction of the

effectiveness of the ventilation system when the self-ventilated motor operates at low frequencies. Basically the following solutions can be used to prevent the motor overheating :

- Reduction of the rated torque.
- Use of an independent ventilation system (forced ventilation).

Criteria for Torque Reduction

In order to maintain the temperature of the motors within acceptable levels when operating with frequency inverters and without forced ventilation, the load limits shown in Figure 51 must be observed (derating curve of the W50 motor).
This torque reduction is a required solution when the motor drives a load with constant torque. In order to drive loads with quadratic torque, usually it is not necessary to apply any torque reduction factor.

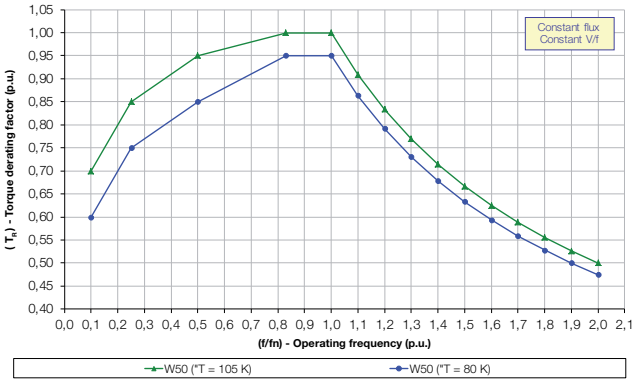


Figure 51 - Derating curve for motors driven by frequency inverter.

For more information on motors operated with frequency inverter, refer to the Technical Guide - Induction motors fed by PWM frequency inverters, which can be found at *http://ecatalog.weg.net/files/wegnet/WEG-induction-motors-fed-by-pwm-frequency-converters-technical-guide-028-technical-article-english.pdf*.

Forced Ventilation Kit

Motors driven by frequency inverter at low speeds generally require an independent ventilation system. In these cases, the application of a forced ventilation kit ensures constant cooling of the motor throughout its speed range.
The forced ventilation kit (see figure 52) comprises a 4-pole motor with independent power supply from the main motor, and it is not subject to its operating conditions.
This ventilation kit uses a motor with natural cooling method (IC410 or IC40).

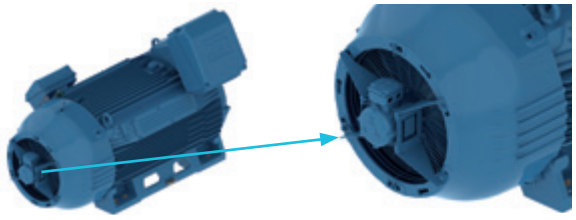


Figure 52 - Detail of the assembly of the forced ventilation kit with cast iron air baffle.

The supply voltages available for the forced ventilation kit of the W50 motors are listed in table 24.

Supply voltage available for the forced ventilation kit (V)
208-230/460
220-240/380-415
220/380-440
380-415/660
525-550
575
220/380
220/440
230/460
240/480
380/660
400/690
440
460
480

Table 24 - Supply voltages available for the forced ventilation kit.

Note:

- Motors with forced ventilation kits present an increase of 3 dB(A) in the noise level, without taking into account the noise produced by the frequency inverter. Since the global noise value depends on the inverter switching frequency, for more precise information, contact WEG.
- The use of the forced ventilation kit changes the motor length. In Section 12 is possible to check the motor length increase due to the use of the forced ventilation kit.

9.2.2 Common-Mode Voltages

The common mode voltages occur when the sum of the voltages at the inverter output is different from zero. They are the main reason why currents flow through the motor bearings driven by static inverter. These currents wear the balls and the ball bearing races, reducing the bearing lifetime and causing premature failures. The W50 motors are supplied with shaft grounding brushes to prevent the current flow through the bearing and this avoid its premature failure, see item 2.4 . Grounding Brush.

10. Installation Characteristics

Some important aspects must be taken into account when dimensioning the installations of the W50 motors, which are described below.

10.1 Strength and Mass of the Motor Mechanical Support System (MSS)

Regardless the mounting type or design of the motor Mechanical Support System (MSS), the assembly must be strong enough with relatively high mass.
Several tools can be used to evaluate the strength of the foundation, such as experimental or numerical analysis.
The base must present vibration levels less than 30% of the vibration measured on the motor in positions next to the

fixation points in the horizontal, vertical and axial directions. The design of the base must also ensure that its the natural frequencies does not match the running frequency of the motor, also keeping a separation of ±5% from the natural frequency to twice and three times the speed frequency and to once and twice the power line frequency (60 e 120 Hz). Motors that operate with frequency inverter and variable mechanical speed must have the natural frequencies of the system removed from the inverter operating range, so that there are no natural frequencies of the whole system (motor + base + driven equipment) throughout this operating range.
Metal fixtures of the motor must feature anchors securely fastened to the foundation anchor plate, avoiding the connection to the motor only with metal parts.
Since structural steels absorb little external vibration and do not damp the motor vibrations, the global vibration and noise levels may increase.
The base design must be robust and withstand the motor without significant deformation, taking into account the mass and stresses on the foundation informed by WEG on the motor data sheet.

10.2 Dimensional Control

The dimensional control must be precise, with tolerance for flatness, parallelism and perpendicularity between the supports, avoiding soft foot or motor misalignment.
The area of the motor footrests in the drive end and non-drive end must be identical. The foundation must also ensure 100% support of the DE and NDE foot.
The foot flatness must be controlled for each motor. W50 motors can have flatness of the feet below 0.127 mm according to IEEE 841 standard.
Vertical mounted motors must be mounted on rectangular or round, solid, steel plates with a hole in the center for the shaft extension. The flange support surface must be machined, with threaded or throughout holes, but the fastening screws must be tightened with controlled torque on flat surfaces.
The steel plate must be at least three times thicker than the machine flange (WEG recommend five times). This mounting base plate must be securely fastened to a solid and leveled surface (in compliance with IEC 60034-7 requirements.).

11. Special Accessories

Some special accessories can be installed on the W50 motors for specific functions, such as speed control, temperature monitoring, and protection against oscillations of the power line or lightning discharges.

11.1 Encoder

For precise speed and shaft position control in critical applications, the W50 motors can be supplied with an encoder.
WEG recommends the use of the following encoders:

- Dynapar- series B58N- 1,024 ppr and 2,048 ppr (hollow shaft). This encoder is easy to mount and ensures good precision (see Figure 53).

Figure 53 - Dynapar B58N Encoder.

- Leine Linde - 861 - 1,024 ppr and 2,048 ppr (hollow shaft). It can also be supplied as an optional item and offers good precision (see Figure 54).

Figure 54 - Leine Linde 861 Encoder.

Other encoder models can be supplied on request.

Note:

- Mounted on the non-drive end of the motor and directly coupled to the shaft extension, the use of this device increases the motor length, which varies according to the encoder.

11.2 Protection Against Voltage Surge

The terminal box of the motor of the W50 high-voltage line can be equipped with an surge arrester per phase (see Figure 55). These components are classified according to the following voltage classes: 3 kV, 6 kV, 9 kV or 12 kV.

Figure 55 - Surge arrester.

Besides the surge arrester, the high-voltage motors also have a surge capacitor per phase as special component (see Figure 56). These devices are installed in the main terminal box and their application recommended in systems potentially subject to voltage peaks during switching operations or lightning discharges. The surge capacitors are installed in a stainless steel enclosure and have the following features:

- Capacitance - 0.5 µF
- Rate voltage - up to 7.2 kV
- Voltage class - 15 kV

Figure 56 - Surge capacitor used in the W50 line.

11.3 Leveling Screw

In order to ensure perfect alignment between the driven machine and the motor, WEG supplies the leveling screws set as an accessory. These components must be used only during the motor installation and must be removed after the shims are placed between the foundation and the machine.

11.4 Non-Reverse Ratchet

Some applications do not allow the inversion of direction of rotation. In order to prevent this reversal, the W50 motors must be fitted with the non-reverse ratchet (see Figure 57).

Figure 57 - Non-reverse ratchet.

11.5 Thermometer

In order to monitor the bearing temperature, for both rolling bearing and sleeve bearing, the motors can be fitted with thermometers.
On the rolling bearings, one thermometer can be installed on each endshield, and for sleeve bearings, thermometers can be installed on the bearing shell or oil tank.

Figure 58 - Thermometers with sights located on the sides.

11.6 Interchangeability Solutions

With the technological progress, machines are increasingly smaller and more efficient, which consequently results in interchangeability problems, especially for older motors or from different manufacturers. In order to solve this problem, the W50 motors can be supplied with an intermediate base (see Figure 59), or also with dimensional variations, especially on feet and frame.

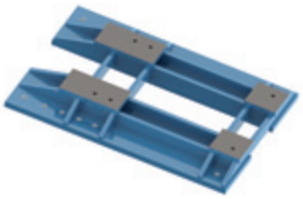


Figure 59 - Intermediate base.

If the replacement a motor with a frame size (shaft end height) immediately above the output power is required, we supply motors on the frame above with a dedicated design, keeping the mass, length and noise similar to the lower frame size.
If necessary to use the height of two frames above (for example, change the 315 frame by the 400 frame), the motors can be supplied with intermediate steel base. In this case, the upper part of the base features the fixation drilling of the standard motor in the required power, and the lower base the fixation drilling of two frames immediately above.

11.7 Automatic Lubricator

The automatic lubricator available for the W50 motors reduces the motor maintenance, especially in applications in which the motor is in a place with difficult access and high ambient temperature or speeds.
The lubricator, when supplied with the motor, has polyurea based grease and it is configured for the lubrication intervals specified on the motor nameplate. The grease canister must be replaced with the same grease or compatible grease in order to ensure smooth motor operation..
The grease outlet works by the same way of the motors with grease nipple.
Easily-accessible, the lubricator can be mounted on the motor sides or endshields (see Figure 60 and 61).

Figure 60 - Lubricator located on the sides.

Figure 61 - Lubricator located on the endshields.

12. Construction Features

Frame			315 H/G	355 J/H	400 L/K	400 J/H	450 L/K	450 J/H
Mechanical features								
Mounting			B3R(E)					
Frame	Material		Cast iron FC-200					
Degree of protection			IP55					
Grounding			Double grounding (1 terminal box + 1 frame)					
Cooling method			TEFC					
Fan	Material	2P	Cast iron FC-200					
		4P - 12P						
Fan cover	Material		Cast iron FC-200 (rolling bearings) - Steel (sleeve bearings)					
Endshields			Cast Iron FC-200					
Drain plug			Automatic drain plug					
Bearing	Shielded/clearance DE		C3					
	Shielded/clearance NDE		C3					
	Locating bearing		Fixed on DE with external and internal bearing cap and preload spring NDE					
	Drive end	2P	6314	6314	6218	6218	6220	6220
		4P - 12P	6320	6322	6324	6324	6328	6328
	Non-drive end	2P	6314	6314	6218	6218	6220	6220
		4P - 12P	6316	6319	6319	6319	6322	6322
Sleeve bearings	Axial clearence		4 mm				4 mm	
	Locating bearing		Located both bearings					
	Drive end	2P	9-80	9-80	9-80	9-80	9-80	9-80
		4P - 12P	9-90	9-100	11-110	11-110	11-125	11-125
	Non-drive end	2P	9-80	9-80	9-80	9-80	9-80	9-80
		4P - 12P	9-90	9-100	11-110	11-110	11-125	11-125
Bearing seal			Taconite Labyrinth					
Lubrification	Type of grease		Mobil Polyrex EM					
	Grease fitting		With grease fitting					
Terminal box	Material		Cast Iron FC-200					
Lead inlet	Main (low voltage)	Size	2 x M63 x 1.5	2 x M80 x 1.5				
	Main (high voltage)		M63 x 1.5					
	Additional		3 x M20 x 1.5					
	Plug		Plastic threaded plug					
Shaft	Material		AISI 4140					
	Threaded hole	2P	M20					
		4P -12P	M24					
Shaft key			C key					
Vibration level			Grade A					
Balancing without/half/full key			With 1/2 key					
Nameplate	Material		Laser printed Stainless Steel AISI 304					
Painting	Type		214P					
	Color		RAL 5009					
Electrical features								
Design			Low voltage, up to 500 HP - Design N / High voltage - not applicable					
Voltage	Single speed		380 V a 6600 V					
Winding	Impregnation		Low voltage - Resin continuous flow / High voltage - VPI					
	Insulation class		F (DT 80 K)					
Space heater			110/220 V - 220/440 V					
Service factor			1.00					
Ambient temperature	Maximum		+40 °C					
	Minimum		-20 °C					
Starting method			DOL					
Rotor			Die cast Aluminium (450 L/K 8 poles with copper bar)					Copper bars
Thermal protection			PT100 - 3-wires (2 per phase)					

13. Optional Features [1) 2)]

Frame	315 H/G	355 J/H	400 L/K	400 J/H	450 L/K	450 J/H
Mechanical optionals						
Terminal box type						
Cast iron	SD	SD	SD	SD	SD	SD
Steel	O	O	O	O	O	O
Terminal block						
BMC 3 terminals - KWHV-M16	SD	SD	SD	SD	SD	SD
BMC 6 terminals - KWLV-M16	SD	SD	SD	SD	SD	SD
Connection bolt (low and high voltage)	S	S	S	S	S	S
Flying leads (low voltage)	S	S	S	S	S	S
Cable gland						
Without cable gland	SD	SD	SD	SD	SD	SD
Plastic	O	O	O	O	O	O
Brass	O	O	O	O	O	O
Stainless steel	O	O	O	O	O	O
Flange						
Without flange	SD	SD	SD	SD	SD	SD
Flange FF	O	O	O	O	O	O
Fan						
Cast iron	SD	SD	SD	SD	SD	SD
Aluminium	S	S	S	S	S	S
Bronze	S	S	S	S	S	S
Steel (carbon or stainless steel)	S	S	S	S	S	S
Drive end bearing type						
Ball bearing	SD	SD	SD	SD	SD	SD
Rolling bearing NU design (4p - 12p)	O	O	O	O	O	O
Sleeve bearing	O	O	O	O	O	O
Non-drive end bearing type						
Ball bearing [3)]	SD	SD	SD	SD	SD	SD
Sleeve bearing	O	O	O	O	O	O
Angular contact ball bearing	S	S	S	S	S	S
Insulated drive endshield hub						
Non isolated	SD	SD	SD	SD	SD	SD
Isolated bearing	S	S	S	S	S	S
Isolated end shield	S	S	S	S	S	S
Insulated non-drive endshield hub						
Isolated end shield	SD	SD	SD	SD	SD	SD
Isolated bearing	S	S	S	S	S	S
Non isolated	S	S	S	S	S	S
Bearing cap						
Bearing cap	SD	SD	SD	SD	SD	SD
Drive end bearing seal						
Taconite labyrinth	SD	SD	SD	SD	SD	SD
INPRO/SEAL	O	O	O	O	O	O
Taconite labyrinth with slinger	O	O	O	O	O	O
Mechanical seal	O	O	O	O	O	O
Joint seal						
Loctite 5923 (Permatex) on joints	O	O	O	O	O	O
Shaft						
Material: AISI 4140	SD	SD	SD	SD	SD	SD
Shaft locking device	SD	SD	SD	SD	SD	SD
Threaded center hole (shaft)	SD	SD	SD	SD	SD	SD
Second shaft end	S	S	S	S	S	S

Balance type						
Normal balance with 1/2 key (for 4 poles on)	SD	SD	SD	SD	SD	SD
Special balance with 1/2 key (for 2 poles)	SD	SD	SD	SD	SD	SD
Key						
C key	SD	SD	SD	SD	SD	SD
B key	S	S	S	S	S	S
Vibration level						
Grade A	SD	SD	SD	SD	SD	SD
Grade B	O	O	O	O	O	O
Lubrication						
Mobil Polyrex EM	SD	SD	SD	SD	SD	SD
Aeroshell 7	S	S	S	S	S	S
Isoflex NBU 15	S	S	S	S	S	S
Oil mist	S	S	S	S	S	S
Grease fitting						
Carbon steel grease fitting	SD	SD	SD	SD	SD	SD
Threaded grease fitting NPT 1/4"	S	S	S	S	S	S
Grease fiting able to oil mist	S	S	S	S	S	S
Grease outlet						
Grease outlet by plastic slide valve	SD	SD	SD	SD	SD	SD
Grease outlet through endshield	S	S	S	S	S	S
Drain						
Automatic drain plug	SD	SD	SD	SD	SD	SD
Threaded drain plug (closed)	O	O	O	O	O	O
Stainless stell threaded drain plug (closed)	O	O	O	O	O	O
Threaded T-type drain plug (automatic)	O	O	O	O	O	O
Closed plastic drain plug	S	S	S	S	S	S
Degree of protection						
IP55	SD	SD	SD	SD	SD	SD
IP56	O	O	O	O	O	O
IP65	O	O	O	O	O	O
IP66	O	O	O	O	O	O
IPW55	O	O	O	O	O	O
IPW56	O	O	O	O	O	O
IPW65	O	O	O	O	O	O
IPW66	O	O	O	O	O	O
Painting plan						
214P - ISO C5 (I and M) durability class “High” - Indicated for aggressive sheltered and non-sheltered environment. Industrial application that allows SO2, steams, solid contaminant, high humidity and alkali and solvent sprinkles presence	SD	SD	SD	SD	SD	SD
212E - ISO C5 (I and M) durability class “High” - Indicated for marine aggressive environment or marine industrial environment, sheltered allowing high humidity and alkali and solvent sprinkles presence. Indicate to pulp and paper, mining and chemical industrial applications	O	O	O	O	O	O
212P - ISO C5 (I and M) durability class “High” - Indicated for marine aggressive environment or marine industrial environment, sheltered or nonsheltered, allowing high humidity presence. Indicate to pulp and paper, mining and chemical industrial applications	O	O	O	O	O	O
213E - ISO C5 (I and M) durability class “High” - Indicated for marine aggressive environment or marine industrial environment, sheltered, allowing high humidity presence. Indicated to offshore ambient	O	O	O	O	O	O
216P - ISO C5 (I and M) durability class “High” - Indicated for marine environments, with salinity, containing or not sulfur-derivated gases. Operating temperature: 15 °C to 80 °C. Indicated for fixed and mobile platforms, exploration and production vessels, submerged structures, piers, single mooring buoys and others	O	O	O	O	O	O
Internal tropicalized painting (epoxi)	O	O	O	O	O	O

Notes: 1) Other optional features, on request;
2) Some combinations of optional features are not allowed - then contact WEG;
3) Vertical motors are supplied with angular contact ball bearing, except frames 315 H/G (4p - 12p).

SD - Standard
O - Optional
S - Special

13. Optional Features [1) 2)]

Other mechanical optionals						
Ventilated bearing	SD	SD	SD	SD	SD	SD
Drip cover	O	O	O	O	O	O
Rubber slinger	S	S	S	S	S	S
Electrical optionals						
Winding protection						
3-wire Pt-100, 2 per phase (alarm)	SD	SD	SD	SD	SD	SD
3-wire Pt-100, 2 per phase (tripping)	SD	SD	SD	SD	SD	SD
3-wire Pt-100, 2 per phase, calibrated (alarm)	O	O	O	O	O	O
3-wire Pt-100, 2 per phase, calibrated (tripping)	O	O	O	O	O	O
PTC thermistor - 130 °C (alarm)	O	O	O	O	O	O
PTC thermistor - 155 °C (tripping)	O	O	O	O	O	O
Bimetal thermal protector - 130 °C (alarm)	O	O	O	O	O	O
Bimetal thermal protector - 155 °C (tripping)	O	O	O	O	O	O
Bearing thermal protection						
3-wire Pt-100 - drive end / non drive end	SD	SD	SD	SD	SD	SD
3-wire calibrated Pt-100 - drive end / non drive end	O	O	O	O	O	O
Two 3-wire Pt-100 - drive end / non drive end	O	O	O	O	O	O
Two 3-wire calibrated Pt-100 - drive end / non drive end	O	O	O	O	O	O
Bimetal thermal protector - drive end / non-drive end	O	O	O	O	O	O
Space heaters						
110-127 / 220-240 V	SD	SD	SD	SD	SD	SD
380-480 V	O	O	O	O	O	O
Insulation class						
F	SD	SD	SD	SD	SD	SD
H	S	S	S	S	S	S
Forced ventilation kit						
Forced ventilation kit prepared for encoder assembly	O	O	O	O	O	O
Encoder						
Without encoder	SD	SD	SD	SD	SD	SD
Dynapar B58N	O	O	O	O	O	O
Leine&Linde XH861 900220-1024	O	O	O	O	O	O
Leine&Linde XH861 900220-2048	O	O	O	O	O	O
Grounding brush kit						
Drive end grounding brush	O	O	O	O	O	O
Drive end SGR grounding brush	O	O	O	O	O	O

Notes: 1) Other optional features, on request;
2) Some combinations of optional features are not allowed - then contact WEG;

SD - Standard
O - Optional
S - Special

14. Electrical Data

14.1 W50 - Low Voltage

Output		Frame	Full load torque (kgfm)	Locked rotor current Il/In	Locked rotor torque Tl/Tn	Break-down torque Tb/Tn	Inertia J (kgm2)	Allowable locked rotor time (s)		Weight (kg)	Sound dB(A)	400 V							
												Rated speed (rpm)	% of full load						Full load current In (A)
													Efficiency			Power factor			
kW	HP							Hot	Cold				50	75	100	50	75	100	
II poles																			
200	270	315 H/G	65.4	6.7	1.0	2.4	3.21	24	53	1485	75	2980	95.0	95.8	95.9	0.81	0.87	0.89	338
250	340	315 H/G	81.8	6.7	1.1	2.4	4.01	20	44	1665	75	2978	95.5	96.0	96.0	0.86	0.90	0.90	418
280	380	315 H/G	91.6	6.8	1.1	2.4	4.01	16	35	1665	75	2977	95.6	96.0	96.0	0.85	0.90	0.90	468
315	430	315 H/G	103	7.5	1.2	2.5	4.50	14	31	1710	75	2979	95.7	96.2	96.3	0.85	0.90	0.90	525
355	480	355 J/H	116	6.5	1	2.4	5.74	45	99	2352	78	2976	95.8	96.3	96.4	0.85	0.90	0.91	584
400	550	355 J/H	131	6.8	1	2.4	6.44	45	99	2405	78	2977	96.0	96.3	96.5	0.85	0.90	0.91	657
450	610	355 J/H	147	7.0	1	2.4	7.12	33	73	2615	78	2978	96.0	96.5	96.6	0.85	0.90	0.91	739
500	680	355 J/H	163	7.5	1.1	2.4	7.93	35	77	2550	78	2980	96.1	96.6	96.7	0.85	0.90	0.91	820
560	750	400 J/H	183	7.1	1.3	2.5	11.0	26	57	3160	78	2980	95.8	96.5	96.6	0.84	0.89	0.90	930
630	850	400 J/H	206	7.5	1.3	2.5	12.9	26	57	3245	78	2980	96.0	96.6	96.7	0.85	0.90	0.91	1030
IV poles																			
250	340	315 H/G	164	7.0	1.3	2.5	5.75	17	37	1572	75	1485	95.0	95.6	95.8	0.76	0.83	0.86	438
280	380	315 H/G	184	7.0	1.4	2.6	6.32	19	42	1615	75	1485	95.3	95.8	95.9	0.76	0.83	0.86	490
315	430	315 H/G	207	7.0	1.5	2.7	7.01	16	35	1700	75	1485	95.3	95.9	96.0	0.75	0.82	0.85	557
355	480	315 H/G	233	7.5	1.5	2.7	7.58	15	33	1742	75	1485	95.5	96.0	96.1	0.75	0.82	0.86	620
400	550	355 J/H	262	6.5	1.5	2.3	13.8	30	66	2465	78	1489	95.8	96.2	96.4	0.79	0.85	0.87	688
450	610	355 J/H	294	6.5	1.5	2.3	13.8	30	66	2465	78	1489	96.0	96.4	96.6	0.79	0.85	0.87	773
500	680	355 J/H	327	7.0	1.5	2.4	15.3	26	57	2550	78	1488	96.2	96.5	96.7	0.77	0.85	0.87	858
560	750	400 J/H	367	7.0	1.4	2.2	17.6	20	44	3145	78	1488	96.3	96.6	96.8	0.76	0.82	0.86	971
630	850	400 J/H	412	7.0	1.4	2.3	20.0	18	40	3825	78	1489	96.5	96.8	97.0	0.76	0.82	0.86	1090
710	970	400 J/H	465	8.2	1.4	2.4	22.4	13	29	3952	78	1487	96.5	97.0	97.0	0.74	0.82	0.86	1230
800	1100	450 L/K	522	7.0	0.7	2.5	22.0	20	44	4355	78	1492	95.8	96.6	96.8	0.76	0.84	0.87	1370
900	1250	450 L/K	588	7.0	0.7	2.5	25.0	20	44	4607	78	1492	95.9	96.6	96.9	0.76	0.84	0.87	1540
1000	1350	450 J/H	653	7.5	0.7	2.5	28.0	20	44	4862	78	1492	96.0	96.8	97.0	0.76	0.84	0.87	1710
VI poles																			
185	250	315 H/G	183	6.1	1.4	2.5	8.76	16	35	1547	73	986	94.5	94.8	95.0	0.73	0.82	0.86	327
200	270	315 H/G	198	6.1	1.4	2.5	9.51	17	37	1581	73	985	94.8	95.0	95.0	0.77	0.85	0.87	350
250	340	315 H/G	247	6.1	1.5	2.5	11.4	14	31	1666	73	985	95.0	95.4	95.1	0.77	0.85	0.87	435
280	380	355 J/H	276	6.0	1.3	2.5	13.1	28	62	1965	73	989	95.0	95.5	95.5	0.73	0.82	0.85	496
355	480	355 J/H	350	6.0	1.3	2.5	16.0	27	59	2397	73	988	95.7	96.0	96.0	0.75	0.83	0.86	621
400	550	400 J/H	393	6.2	1.3	2.3	22.0	20	44	3060	77	992	95.9	96.3	96.3	0.73	0.81	0.85	705
450	610	400 J/H	442	6.2	1.3	2.3	22.0	20	44	3060	77	992	95.7	96.2	96.2	0.73	0.81	0.85	792
500	680	400 J/H	491	6.5	1.3	2.3	24.8	16	35	3230	77	992	95.9	96.4	96.4	0.73	0.82	0.85	878
560	750	400 J/H	550	6.0	1.4	2.3	27.1	16	35	3774	77	992	96.0	96.5	96.5	0.71	0.81	0.85	982
630	850	450 L/K	618	6.5	0.8	2.4	33.0	20	44	4335	75	993	96.1	96.3	96.3	0.77	0.84	0.87	1080
710	970	450 L/K	696	6.5	0.8	2.4	37.4	20	44	4607	75	993	96.1	96.3	96.3	0.77	0.84	0.87	1220
800	1100	450 J/H	784	6.5	0.8	2.4	41.9	20	44	4862	75	994	96.1	96.4	96.4	0.77	0.84	0.87	1370

14. Electrical Data

14.1 W50 - Low Voltage

Output		Frame	Full load torque (kgfm)	Locked rotor current Il/In	Locked rotor torque Tl/Tn	Break-down torque Tb/Tn	Inertia J (kgm2)	Allowable locked rotor time (s)		Weight (kg)	Sound dB(A)	400 V							
												Rated speed (rpm)	% of full load						Full load current In (A)
													Efficiency			Power factor			
kW	HP							Hot	Cold				50	75	100	50	75	100	
VIII poles																			
160	220	315 H/G	211	5.7	1.2	2.3	9.78	22	48	1572	71	738	94.3	94.9	94.9	0.68	0.78	0.82	297
185	250	315 H/G	244	5.7	1.2	2.4	11.6	25	55	1700	71	738	94.6	95.1	95.1	0.70	0.79	0.82	342
200	270	315 H/G	264	6.2	1.2	2.5	12.3	19	42	1785	71	739	94.7	95.2	95.2	0.68	0.78	0.82	370
250	340	355 J/H	328	5.5	1.2	2.4	18.0	21	46	2082	71	742	95.0	95.7	95.7	0.67	0.76	0.82	460
280	380	355 J/H	368	5.5	1.2	2.3	21.1	22	48	2397	71	742	95.3	95.8	95.7	0.70	0.78	0.82	515
315	430	355 J/H	413	6.0	1.2	2.4	23.2	19	42	2533	71	742	95.4	95.8	95.8	0.68	0.77	0.82	579
355	480	400 L/K	465	6.8	1.8	2.5	32.2	22	48	3060	75	743	94.8	95.4	95.7	0.66	0.77	0.81	661
400	550	400 J/H	524	6.8	1.2	2.5	34.5	22	48	3060	75	743	94.9	95.6	95.9	0.66	0.77	0.81	743
450	610	400 J/H	590	6.8	1.2	2.5	36.9	20	44	3230	75	743	95.0	95.7	96.0	0.66	0.77	0.81	835
500	680	400 J/H	655	7.3	1.2	2.5	43.6	22	48	3944	75	743	95.2	95.9	96.2	0.66	0.77	0.81	926
560	750	450 J/H	732	5.9	0.8	2.2	61.2	26	57	4995	75	745	95.8	96.2	96.3	0.71	0.80	0.84	1000
630	850	450 J/H	825	6.1	0.8	2.2	65.8	26	57	5168	75	744	96.0	96.4	96.5	0.74	0.82	0.86	1100
X poles																			
75	100	315 H/G	124	5.5	1.5	2.0	6.89	15	33	1343	71	590	91.6	92.5	92.5	0.51	0.63	0.70	167
90	125	315 H/G	149	5.5	1.5	2	8.38	15	33	1445	71	590	91.8	92.8	92.8	0.51	0.63	0.70	200
110	150	315 H/G	182	5.5	1.5	2	10.7	15	33	1615	71	590	92.2	93.0	93.0	0.51	0.63	0.70	244
132	175	315 H/G	218	6.3	1.6	2	12.9	15	33	1785	71	590	92.6	93.2	93.2	0.51	0.63	0.70	292
160	220	355 J/H	264	5.5	1.2	2	17.0	20	44	1998	71	591	92.8	93.8	94.0	0.50	0.62	0.69	356
185	250	355 J/H	305	5.5	1.2	2	20.1	20	44	2338	71	591	93.0	94.0	94.2	0.50	0.62	0.69	411
200	270	355 J/H	330	5.5	1.2	2	21.7	20	44	2397	71	591	93.2	94.2	94.4	0.50	0.62	0.69	443
220	300	355 J/H	363	6.0	1.2	2	24.8	20	44	2533	71	591	93.4	94.4	94.6	0.50	0.62	0.69	486
250	340	400 L/K	411	5.5	1	2.2	26.5	22	48	2890	75	593	94.8	95.4	95.4	0.60	0.72	0.78	485
280	380	400 L/K	460	5.5	1	2.2	31.1	22	48	3014	75	593	95.0	95.6	95.6	0.60	0.72	0.78	542
315	430	400 L/K	517	5.5	1	2.2	33.5	22	48	3166	75	593	95.2	95.8	95.8	0.60	0.72	0.78	608
355	480	400 J/H	583	5.5	1	2.2	38.1	22	48	3340	75	593	95.4	96.0	96.0	0.60	0.72	0.78	684
400	550	400 J/H	657	5.5	1	2.2	40.4	22	48	3485	75	593	95.6	96.2	96.2	0.60	0.72	0.78	769
450	610	450 L/K	737	6.2	0.8	2.2	67.0	25	55	4055	75	595	95.4	95.8	95.8	0.60	0.72	0.79	858
500	680	450 J/H	818	6.2	0.8	2.2	75.0	25	55	4267	75	595	95.6	96.0	96.0	0.60	0.72	0.79	952
560	750	450 J/H	917	6.2	0.8	2.2	80.0	25	55	4510	75	595	95.8	96.2	96.2	0.61	0.73	0.80	1050
XII poles																			
132	175	355 J/H	261	4.3	1.3	1.8	18.5	20	44	2091	71	493	93.3	94.0	94.0	0.48	0.60	0.67	303
160	220	355 J/H	316	4.8	1.2	1.8	24.5	20	44	2635	71	493	93.5	94.0	94.0	0.48	0.60	0.67	367
200	270	400 L/K	395	5.5	1	2.1	32.8	20	44	2890	75	493	94.0	94.5	94.5	0.54	0.67	0.74	413
250	340	400 L/K	492	5.5	1.2	2.3	38.6	20	44	3137	75	495	94.8	95.0	95.0	0.57	0.69	0.75	506
280	380	400 J/H	551	5.5	1.2	2.3	41.0	20	44	3595	75	495	94.8	95.0	95.0	0.57	0.69	0.75	567
315	430	450 L/K	620	5.5	0.8	1.9	59.1	40	88	3872	75	495	94.9	95.1	95.1	0.61	0.71	0.77	621
355	480	450 L/K	699	5.5	0.8	1.9	67.6	40	88	4072	75	495	95.1	95.3	95.3	0.61	0.71	0.77	698
400	550	450 L/K	787	5.5	0.8	1.9	72.0	40	88	4292	75	495	95.3	95.5	95.5	0.61	0.71	0.77	785
450	610	450 J/H	885	5.5	0.8	1.9	76.2	40	88	4513	75	495	95.5	95.7	95.7	0.62	0.72	0.78	870
500	680	450 J/H	984	5.5	0.8	1.9	80.5	40	88	4777	75	495	95.7	95.9	95.9	0.62	0.72	0.78	965

14. Electrical Data

14.2 W50 - High Voltage - 1.2 kV to 5.0 kV

Output		Frame	Full load torque (kgfm)	Locked rotor current Il/In	Locked rotor torque Tl/Tn	Break-down torque Tb/Tn	Inertia J (kgm2)	Allowable locked rotor time (s)		Weight (kg)	Sound dB(A)	3,300 V							
												Rated speed (rpm)	% of full load						Full load current In (A)
													Efficiency			Power factor			
kW	HP							Hot	Cold				50	75	100	50	75	100	
II poles																			
160	220	315 H/G	52.4	5.8	0.9	2.2	2.87	16	35	1540	75	2975	94.0	94.5	94.6	0.82	0.88	0.88	33.6
185	250	315 H/G	60.6	5.8	0.9	2.2	2.87	16	35	1540	75	2975	94.0	94.6	94.6	0.82	0.88	0.88	38.9
200	270	315 H/G	65.5	5.9	0.9	2.2	3.09	16	35	1580	75	2975	94.1	94.7	94.7	0.82	0.88	0.89	41.5
220	300	315 H/G	72.0	6.0	1	2.3	3.31	15	33	1620	75	2975	94.3	94.8	94.9	0.81	0.87	0.88	46.1
250	340	315 H/G	81.8	6.0	1	2.3	3.53	13	29	1660	75	2975	94.5	95.0	95.1	0.80	0.87	0.88	52.3
280	380	315 H/G	91.7	6.2	1	2.3	3.75	13	29	1700	75	2975	94.6	95.1	95.2	0.80	0.86	0.88	58.5
315	430	315 H/G	103	6.5	1.1	2.4	3.97	12	26	1740	75	2975	94.8	95.3	95.3	0.79	0.86	0.88	65.7
355	480	355 J/H	116	5.9	0.8	2.4	5.09	25	55	2200	78	2970	95.3	95.6	95.6	0.83	0.88	0.89	73.0
400	550	355 J/H	131	6.0	0.8	2.4	5.72	25	55	2300	78	2970	95.4	95.7	95.7	0.83	0.88	0.89	82.2
450	610	400 J/H	147	6.3	1	2.4	9.18	25	55	3000	78	2980	95.7	96.2	96.2	0.83	0.88	0.90	90.9
500	680	400 J/H	163	6.3	1	2.4	10.9	25	55	3210	78	2980	96.0	96.1	96.3	0.83	0.88	0.90	101
560	750	400 J/H	183	6.5	1.2	2.5	11.2	25	55	3260	78	2982	96.2	96.5	96.5	0.83	0.88	0.90	113
630	850	450 L/K	206	6.2	0.7	2.5	14.6	20	44	3590	78	2984	96.0	96.5	96.5	0.80	0.86	0.89	128
710	970	450 L/K	232	6.3	0.7	2.5	15.5	20	44	3670	78	2985	96.0	96.5	96.5	0.78	0.86	0.88	146
800	1100	450 J/H	261	6.3	0.7	2.5	24.1	20	44	4720	78	2982	96.1	96.6	96.6	0.87	0.87	0.90	161
900	1250	450 J/H	294	6.5	0.7	2.5	24.1	15	33	4720	78	2981	96.1	96.7	96.7	0.87	0.87	0.90	181
1000	1350	450 J/H	326	6.5	0.9	2.5	26.6	20	44	5000	78	2988	96.1	96.7	96.7	0.87	0.87	0.88	206

Note: 1) Temperature rise ΔT 105 K.

14. Electrical Data

14.2 W50 - High Voltage - 1.2 kV to 5.0 kV

Output		Frame	Full load torque (kgfm)	Locked rotor current Il/In	Locked rotor torque Tl/Tn	Break-down torque Tb/Tn	Inertia J (kgm2)	Allowable locked rotor time (s)		Weight (kg)	Sound dB(A)	3,300 V							
												Rated speed (rpm)	% of full load						Full load current In (A)
													Efficiency			Power factor			
kW	HP							Hot	Cold				50	75	100	50	75	100	
IV poles																			
150	200	315 H/G	98.5	6.0	1.2	2.1	4.36	14	31	1610	75	1483	93.0	93.7	94.4	0.72	0.80	0.84	33.1
160	220	315 H/G	105	6.0	1.2	2.1	4.69	14	31	1650	75	1483	93.0	93.8	94.4	0.72	0.80	0.84	35.3
185	250	315 H/G	121	6.0	1.2	2.1	5.02	14	31	1690	75	1484	93.2	93.9	94.4	0.72	0.80	0.84	40.8
200	270	315 H/G	131	6.0	1.2	2.1	5.35	15	33	1730	75	1484	93.3	94.0	94.5	0.72	0.80	0.84	44.1
220	300	315 H/G	144	6.0	1.3	2.3	5.35	15	33	1730	75	1484	93.3	94.0	94.5	0.73	0.80	0.84	48.5
250	340	315 H/G	164	6.2	1.3	2.3	6.02	15	33	1810	75	1484	93.4	94.3	94.6	0.73	0.81	0.84	55.0
280	380	315 H/G	184	6.3	1.4	2.4	6.02	15	33	1820	75	1485	94.0	94.6	94.9	0.70	0.81	0.84	61.5
315	430	315 H/G	207	6.3	1.3	2.3	7.13	15	33	1950	75	1485	94.6	95.0	95.1	0.72	0.81	0.84	69.0
355	480	355 J/H	232	6.3	1.6	2.4	9.72	25	55	2390	78	1488	94.5	95.0	95.3	0.71	0.80	0.84	77.6
400	550	355 J/H	262	6.2	1.2	2.2	11.5	17	37	2560	78	1487	95.0	95.5	95.5	0.75	0.82	0.84	87.2
450	610	355 J/H	294	6.2	1.3	2.2	12.9	17	37	2690	78	1489	95.0	95.8	95.8	0.69	0.79	0.83	99.0
500	680	400 L/K	327	6.2	1.2	2.3	18.1	25	55	3070	78	1490	95.4	95.8	95.8	0.71	0.80	0.84	109
560	750	400 J/H	366	6.3	1.2	2.3	19.5	25	55	3310	78	1490	95.9	96.2	96.2	0.72	0.80	0.84	121
590	800	400 J/H	386	6.3	1.2	2.3	21.0	25	55	3410	78	1490	96.0	96.3	96.3	0.72	0.81	0.84	128
630	850	400 J/H	412	6.3	1.2	2.3	22.4	25	55	3540	78	1490	96.1	96.4	96.5	0.73	0.81	0.84	136
660	900	450 L/K	431	6.1	1	2.5	22.8	30	66	3880	78	1490	95.7	96.1	96.1	0.74	0.82	0.85	141
710	970	450 L/K	464	6.3	0.9	2.5	22.8	25	55	3880	78	1490	95.8	96.2	96.2	0.73	0.83	0.86	150
750	1000	450 L/K	490	6.3	0.9	2.5	26.8	25	55	4090	78	1490	96.0	96.4	96.4	0.73	0.84	0.86	158
800	1100	450 L/K	523	6.3	0.9	2.5	28.8	25	55	4300	78	1490	96.2	96.5	96.4	0.75	0.84	0.86	169
900	1250	450 J/H	588	6.3	0.9	2.5	30.8	25	55	4660	78	1490	96.2	96.6	96.5	0.75	0.84	0.86	190
1000	1350	450 J/H	654	6.5	0.8	2.5	26.4	25	55	5020	78	1490	96.3	96.6	96.5	0.81	0.85	0.87	208
1100	1500	450 J/H	719	6.5	0.8	2.5	35.8	25	55	5200	78	1490	96.2	96.6	96.6	0.80	0.85	0.87	229
1250	1700	450 J/H	816	6.5	0.8	2.5	35.8	25	55	5200	78	1492	96.2	96.7	96.7	0.77	0.85	0.87	260

Note: 1) Temperature rise ΔT 105 K.

14. Electrical Data

14.2 W50 - High Voltage - 1.2 kV to 5.0 kV

Output		Frame	Full load torque (kgfm)	Locked rotor current Il/In	Locked rotor torque Tl/Tn	Break-down torque Tb/Tn	Inertia J (kgm2)	Allowable locked rotor time (s)		Weight (kg)	Sound dB(A)	3,300 V							
												Rated speed (rpm)	% of full load						Full load current In (A)
													Efficiency			Power factor			
kW	HP							Hot	Cold				50	75	100	50	75	100	
VI poles																			
150	200	315 H/G	148	6.7	1.3	2.5	5.79	15	33	1730	73	990	93.0	93.6	94.2	0.58	0.72	0.76	36.7
160	220	315 H/G	157	6.1	1.2	2.5	5.79	15	33	1730	73	990	93.3	93.7	94.3	0.60	0.72	0.78	38.1
185	250	315 H/G	182	6.0	1.2	2.4	6.12	15	33	1770	73	988	93.7	93.9	94.3	0.60	0.72	0.79	43.4
200	270	315 H/G	197	6.0	1.2	2.4	6.67	15	33	1840	73	988	94.0	94.0	94.3	0.63	0.73	0.79	47.0
220	300	315 H/G	217	6.0	1.2	2.4	7.22	15	33	1910	73	988	94.2	94.4	94.5	0.63	0.74	0.80	50.9
250	340	355 J/H	246	5.9	1.5	2.2	12.7	20	44	2380	73	989	94.0	94.4	94.6	0.65	0.75	0.80	57.8
280	380	355 J/H	275	5.9	1.5	2.3	13.8	18	40	2460	73	990	94.2	94.6	94.6	0.64	0.75	0.80	64.7
315	430	355 J/H	310	5.9	1.4	2.2	16.1	18	40	2610	73	989	94.5	94.8	94.8	0.68	0.75	0.80	72.7
355	480	355 J/H	349	6.0	1.4	2.2	17.3	18	40	2690	73	990	94.5	94.9	94.9	0.67	0.75	0.80	81.8
400	550	355 J/H	393	6.2	1.1	2.5	17.3	15	33	2680	73	991	95.0	95.3	95.4	0.65	0.75	0.80	91.7
450	610	400 L/K	441	6.0	1.1	2.4	23.4	20	44	3000	77	993	94.8	95.3	95.3	0.70	0.79	0.82	101
500	680	400 J/H	490	6.0	1.1	2.4	25.3	20	44	3240	77	993	95.0	95.5	95.5	0.70	0.80	0.83	110
560	750	400 J/H	549	6.0	1.1	2.4	29.1	20	44	3460	77	993	95.2	95.6	95.6	0.70	0.80	0.83	123
590	800	450 L/K	579	6.1	1	2.5	27.1	20	44	3980	77	992	95.6	95.8	95.9	0.70	0.80	0.83	130
630	850	450 L/K	619	6.0	1	2.5	32.4	20	44	4120	77	992	95.6	95.9	96.0	0.70	0.80	0.84	137
660	900	450 L/K	648	6.3	1	2.5	37.8	25	55	4270	77	992	95.7	96.0	96.0	0.70	0.80	0.84	143
710	970	450 L/K	697	6.3	1.1	2.5	43.1	25	55	4410	77	992	95.7	96.0	96.0	0.70	0.80	0.84	154
750	1000	450 J/H	736	6.4	1.1	2.5	43.1	25	55	4630	77	992	95.8	96.0	96.0	0.70	0.80	0.84	163
800	1100	450 J/H	785	6.4	1.1	2.5	36.6	25	55	4830	77	992	95.7	96.1	96.0	0.72	0.81	0.84	174
900	1250	450 J/H	884	6.4	1.1	2.5	40.7	25	55	4970	77	992	95.7	96.1	96.0	0.73	0.81	0.84	195
1000	1350	450 J/H	982	6.4	1.1	2.5	44.7	25	55	5110	77	992	95.8	96.2	96.1	0.73	0.82	0.84	217

Note: 1) Temperature rise ΔT 105 K.

14. Electrical Data

14.3 W50 - High Voltage - 5.1 kV to 6.6 kV

Output		Frame	Full load torque (kgfm)	Locked rotor current Il/In	Locked rotor torque Tl/Tn	Break-down torque Tb/Tn	Inertia J (kgm2)	Allowable locked rotor time (s)		Weight (kg)	Sound dB(A)	6,600 V							
												Rated speed (rpm)	% of full load						Full load current In (A)
													Efficiency			Power factor			
kW	HP							Hot	Cold				50	75	100	50	75	100	
II poles																			
200	270	315 H/G	65.4	6.3	1.2	2.3	3.77	18	40	1690	75	2979	93.6	94.1	94.2	0.85	0.88	0.89	20.9
220	300	315 H/G	71.9	6.3	1.2	2.3	3.77	13	29	1690	75	2979	93.8	94.2	94.2	0.85	0.88	0.89	23.0
250	340	315 H/G	81.8	6.0	1.2	2.2	3.99	12	26	1740	75	2977	94.2	94.4	94.4	0.85	0.88	0.89	26.0
280	380	355 J/H	91.8	6.1	1.1	2.4	5.66	20	44	2260	78	2972	94.7	95.0	94.9	0.86	0.89	0.90	28.7
315	430	355 J/H	103	6.2	1.1	2.5	5.98	20	44	2330	78	2974	94.9	95.2	95.2	0.85	0.89	0.90	32.2
355	480	355 J/H	116	6.3	1.1	2.5	6.50	20	44	2410	78	2972	95.2	95.4	95.3	0.85	0.89	0.90	36.2
400	550	400 J/H	131	6.3	1	2.5	10.5	20	44	3110	78	2980	95.7	95.8	95.8	0.85	0.89	0.90	40.6
450	610	400 J/H	147	6.5	1	2.5	11.4	18	40	3230	78	2980	95.9	96.1	95.9	0.85	0.89	0.90	45.6
500	680	400 J/H	163	6.5	1	2.5	12.7	18	40	3420	78	2980	96.1	96.2	96.1	0.85	0.89	0.90	50.6
560	750	450 J/H	183	6.8	0.9	2.5	20.6	20	44	4350	78	2985	96.1	96.2	96.2	0.85	0.89	0.90	56.6
590	800	450 J/H	193	6.9	0.9	2.5	20.6	20	44	4400	78	2985	96.1	96.2	96.2	0.85	0.89	0.90	59.6
630	850	450 J/H	206	6.5	0.9	2.5	21.5	20	44	4440	78	2985	96.2	96.3	96.3	0.86	0.89	0.90	63.6
710	970	450 J/H	232	6.8	0.9	2.5	23.5	18	40	4640	78	2985	96.2	96.4	96.4	0.86	0.89	0.90	71.6
800	1100	450 J/H	261	6.7	0.9	2.5	24.9	25	55	4800	78	2985	96.2	96.3	96.4	0.86	0.89	0.90	80.7
900	1250	450 J/H	294	6.7	0.9	2.5	26.1	20	44	4880	78	2985	96.3	96.5	96.4	0.86	0.89	0.90	90.7

Note: 1) Temperature rise ΔT 105 K.

14. Electrical Data

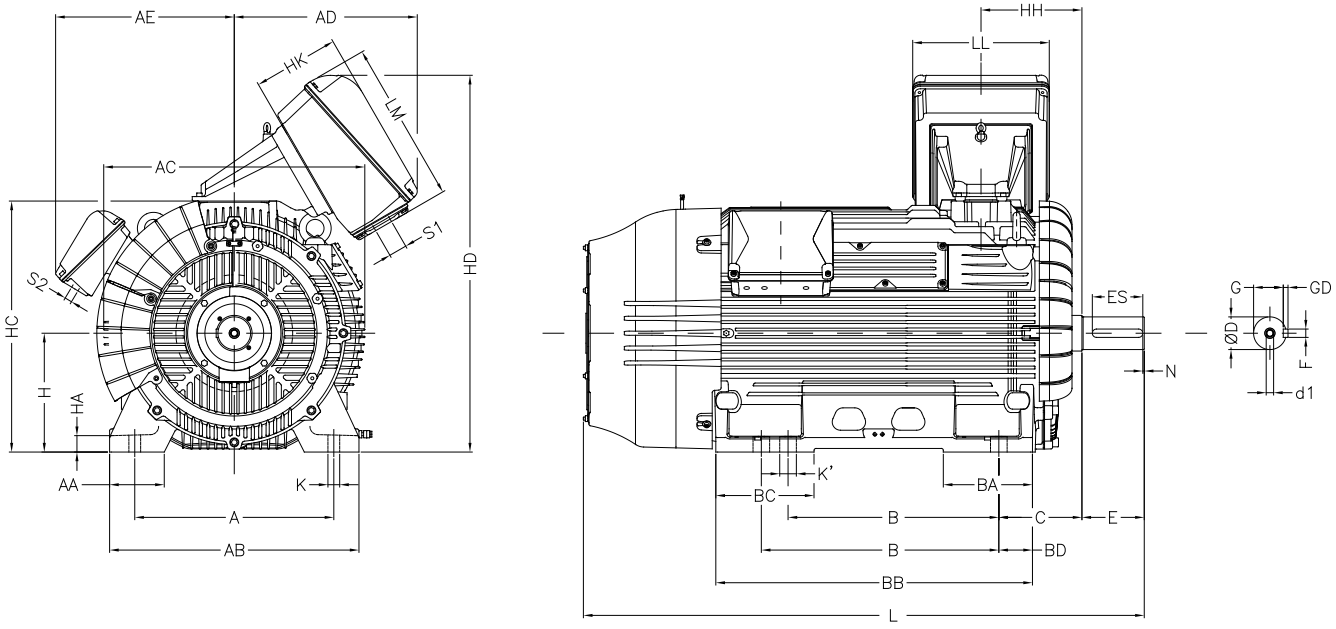
14.3 W50 - High Voltage - 5.1 kV to 6.6 kV

Output		Frame	Full load torque (kgfm)	Locked rotor current Il/In	Locked rotor torque Tl/Tn	Break-down torque Tb/Tn	Inertia J (kgm2)	Allowable locked rotor time (s)		Weight (kg)	Sound dB(A)	6,600 V							
												Rated speed (rpm)	% of full load						Full load current In (A)
													Efficiency			Power factor			
kW	HP							Hot	Cold				50	75	100	50	75	100	
IV poles																			
150	200	315 H/G	98.4	6.1	1.2	2.5	4.28	20	44	1590	75	1485	91.0	92.5	93.1	0.71	0.80	0.85	16.6
160	220	315 H/G	105	6.1	1.2	2.5	4.39	20	44	1600	75	1485	91.3	92.7	93.2	0.71	0.80	0.85	17.7
185	250	315 H/G	121	6.1	1.2	2.5	4.61	20	44	1630	75	1485	92.0	93.1	93.6	0.71	0.80	0.85	20.3
200	270	315 H/G	131	6.1	1.2	2.5	5.05	18	40	1680	75	1485	92.2	93.3	93.7	0.71	0.80	0.85	22.0
220	300	315 H/G	144	6.1	1.2	2.5	5.70	18	40	1760	75	1485	92.8	93.6	94.0	0.71	0.80	0.85	24.1
250	340	315 H/G	164	6.1	1.2	2.5	6.04	18	40	1800	75	1485	93.8	94.4	94.6	0.69	0.80	0.83	27.9
280	380	315 H/G	184	6.0	1.2	2.4	6.58	17	37	1860	75	1485	94.1	94.5	94.6	0.71	0.80	0.83	31.2
315	430	355 J/H	206	5.9	1.5	2.3	9.83	20	44	2370	78	1487	94.6	95.0	95.1	0.72	0.81	0.85	34.1
355	480	355 J/H	233	5.9	1.5	2.3	10.7	20	44	2470	78	1487	94.9	95.3	95.3	0.72	0.81	0.85	38.3
400	550	355 J/H	261	6.2	1.3	2.4	12.5	18	40	2620	78	1490	95.1	95.5	95.7	0.68	0.78	0.83	44.1
450	610	400 J/H	294	5.9	1	2.1	18.0	20	44	3160	78	1489	95.6	95.8	95.9	0.74	0.81	0.84	48.9
500	680	400 J/H	327	5.9	1.1	2.3	19.4	20	44	3290	78	1490	95.9	96.0	96.0	0.73	0.81	0.85	53.6
560	750	400 J/H	366	6.0	1.1	2.4	22.4	20	44	3520	78	1490	95.9	96.0	96.1	0.73	0.81	0.85	60.0
590	800	400 J/H	386	6.1	1.2	2.4	23.8	20	44	3580	78	1490	96.0	96.1	96.2	0.72	0.81	0.85	63.1
630	850	450 L/K	412	6.0	0.9	2.5	25.0	25	55	3990	78	1490	95.8	96.0	96.1	0.76	0.74	0.86	66.7
660	900	450 L/K	431	6.0	0.9	2.5	26.9	25	55	4090	78	1490	95.8	96.1	96.1	0.76	0.74	0.86	69.9
710	970	450 L/K	464	6.0	0.9	2.5	26.9	25	55	4180	78	1490	95.8	96.1	96.2	0.75	0.73	0.86	75.1
750	1000	450 L/K	490	6.0	0.9	2.5	26.9	25	55	4230	78	1490	95.9	96.1	96.2	0.76	0.78	0.86	79.3
800	1100	450 L/K	523	5.9	0.9	2.5	28.8	25	55	4290	78	1490	96.0	96.2	96.3	0.76	0.83	0.86	84.5
900	1250	450 J/H	588	6.5	0.9	2.5	32.1	25	55	4830	78	1490	95.8	96.2	96.3	0.78	0.85	0.87	94.0
VI poles																			
250	340	355 J/H	246	6.0	1.6	2.3	14.8	15	33	2500	73	990	93.1	93.8	94.1	0.64	0.74	0.80	29.1
280	380	355 J/H	275	6.2	1.6	2.3	16.1	15	33	2580	73	990	93.7	94.3	94.5	0.64	0.74	0.80	32.4
315	430	355 J/H	309	6.6	1.1	2.5	16.8	15	33	2630	73	992	94.1	94.8	95.0	0.60	0.72	0.79	36.7
355	480	355 J/H	349	6.5	1.1	2.5	17.3	13	29	2660	73	992	94.5	95.0	95.1	0.60	0.72	0.79	41.3
400	550	400 L/K	393	6.2	1	2.5	25.7	22	48	3070	77	992	94.5	95.2	95.3	0.67	0.78	0.82	44.8
450	610	400 L/K	442	6.2	1	2.5	27.6	22	48	3180	77	992	94.9	95.3	95.4	0.67	0.78	0.83	49.7
500	680	400 J/H	491	5.9	1	2.5	29.5	22	48	3410	77	992	95.2	95.5	95.5	0.70	0.79	0.83	55.2
560	750	450 L/K	550	6.0	1	2.5	32.4	25	55	4060	77	992	95.9	96.1	96.0	0.70	0.80	0.84	60.7
590	800	450 L/K	579	6.1	1	2.5	32.4	25	55	4170	77	992	95.9	96.2	96.1	0.68	0.80	0.83	64.7
630	850	450 L/K	618	6.3	1.2	2.5	34.7	20	44	4250	77	993	96.0	96.2	96.2	0.68	0.78	0.83	69.0
660	900	450 L/K	647	6.5	1.2	2.5	34.7	20	44	4370	77	993	95.9	96.2	96.2	0.65	0.77	0.82	73.2
710	970	450 L/K	696	6.7	1.2	2.5	37.0	20	44	4380	77	993	95.8	96.1	96.2	0.65	0.77	0.82	78.7
750	1000	450 J/H	735	6.8	1.43	2.7	37.0	20	44	4600	77	994	95.9	96.2	96.3	0.61	0.74	0.81	84.1
800	1100	450 J/H [1)]	784	6.8	1.38	2.7	40.3	20	44	4930	77	994	95.4	95.9	96.0	0.67	0.78	0.83	87.8

Note: 1) Temperature rise ΔT 105 K.

15. Mechanical Data

15.1 Frames 315 H/G to 450 J/H

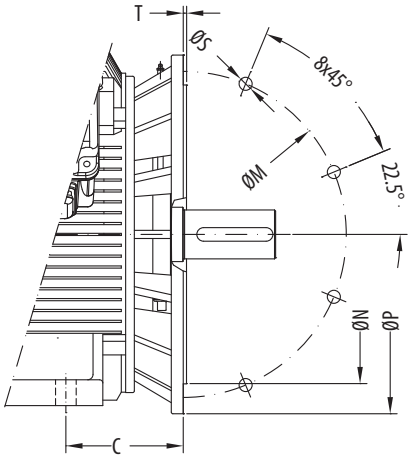


Frame	N° poles	A	AA	AB	AC	AD	AE	B	BA	BB	BC	BD	C	Shaft end						
														D	E	ES	N	F	G	GD
315 H/G	2	508	135	628	706	619	542	710/800	283	980	283	80	216	65	140	125	5	18	58	11
	4/6/8													90	170	140		25	81	14
355 J/H	2	610	150	750	790		569	800/900	298	1082	298	91	254	65	140	125		18	58	11
	4/6/8													100	210	170		28	90	16
400 L/K	2	686	184	840	880		602	710/800	310	1085	340	123	280	80	170	155		22	71	14
	4/6/8													110	210	170		28	100	16
400 J/H	2							900/1000		1235	310			80	170	160		22	71	14
	4/6/8													110	210	170		28	100	16
450 L/K	2	750	204	940	984		612	800/900	351	1237	386	154	315	85	170	140		22	76	14
	4/6/8													130	250	200		32	119	18
450 J/H	2							1000/1120		1387	351			85	170	140		22	76	14
	4/6/8													130	250	200		32	119	18

Frame	N° poles	H	HA	HC	HD	HH	HK	K	K'	L	LL	LM	d1	S1	S2	Bearings	
																DE	NDE
315 H/G	2	315	50	660	1083	321	290	28	38	1649	460	544	M20 x 2.5	M63 x 1.5	3 x M20 x 1.5	6314 C3	6314 C3
	4/6/8									1679			M24 x 3			6320 C3	6316 C3
355 J/H	2	355		750	1173	349			48	1825			M20 x 2.5	2 x M80x1.5		6314 C3	6314 C3
	4/6/8									1895			M24 x 3			6322 C3	6319 C3
400 L/K	2	400		845	1268	340		36	56	1850			M20 x 2.5			6218 C3	6218 C3
	4/6/8									1890			M24 x 3			6324 C3	6319 C3
400 J/H	2									2000			M20 x 2.5			6218 C3	6218 C3
	4/6/8									2040			M24 x 3			6324 C3	6319 C3
450 L/K	2	450	68	942	1365	350				2024			M20 x 2.5			6220 C3	6220 C3
	4/6/8									2104			M24 x 3			6328 C3	6322 C3
450 J/H	2									2174			M20 x 2.5			6220 C3	6220 C3
	4/6/8									2254			M24 x 3			6328 C3	6322 C3

15.2 Flange “FF”

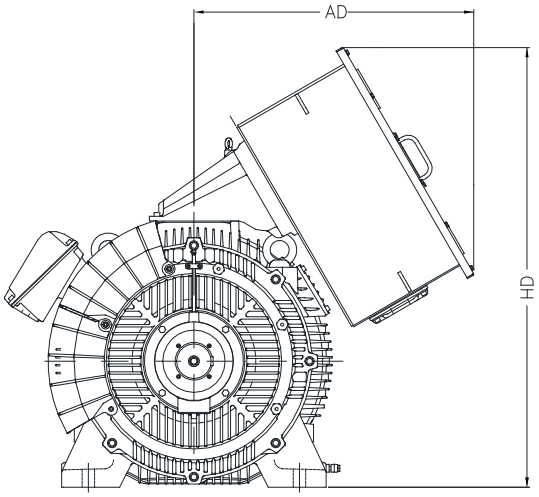
Frame	Flange	C	M	N	P	S	T	N° holes
315 H/G	FF-600	216	600	550	660	24	6	8
355 J/H	FF-740	254	740	680	800			
400 L/K	FF-940	280	940	880	1000	28		
400 J/H								
450 L/K	FF-1080	292.1	1080	1000	1150			
450 J/H								



Utilization of sleeve bearing, forced ventilation and drip cover increases the total length of the motor. This additional length can be seen in the tables below.

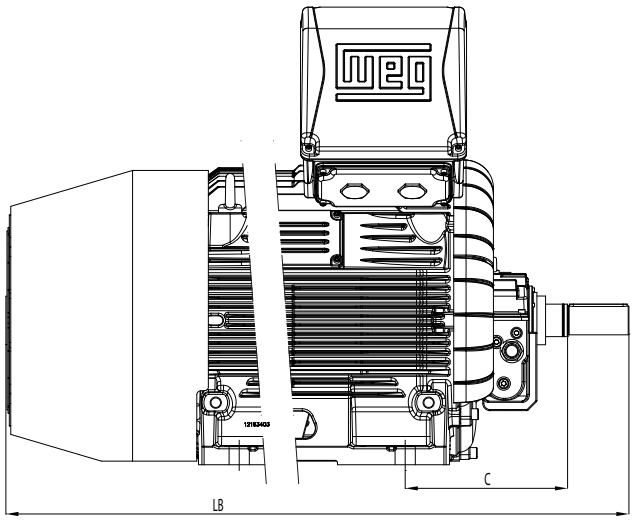
15.3 External Motor Dimensions with Steel Plate Terminal Box

Frame	Designation			
	Steel 1 and Steel 2		Steel 11	
	AD	HD	AD	HD
315 H/G	889	1211	864	1221
355 J/H		1301		1311
400 L/K		1396		1406
400 J/H				
450 L/K		1493		1503
450 J/H				



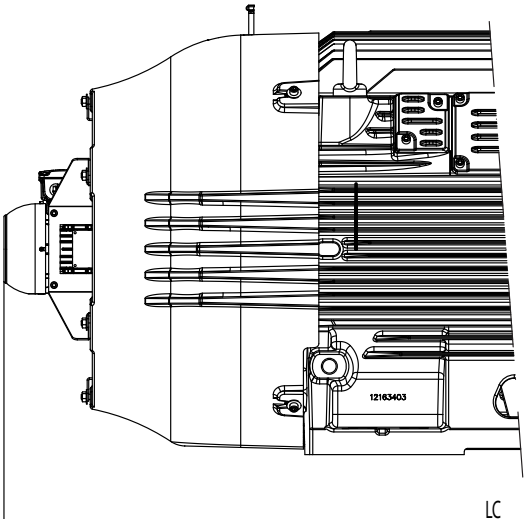
15.4 External Motor Dimensions with Sleeve Bearing

Frame	N° poles	C	LB
315 H/G	2	375	1952
	4 - 8		1969
355 J/H	2	425	2084
	4 - 8		2143
400 L/K	2	450	2060
	4 - 8		2160
400 J/H	2		2210
	4 - 8		2310
450 L/K	2	475	2205
	4 - 8		2320
450 J/H	2		2355
	4 - 8		2470



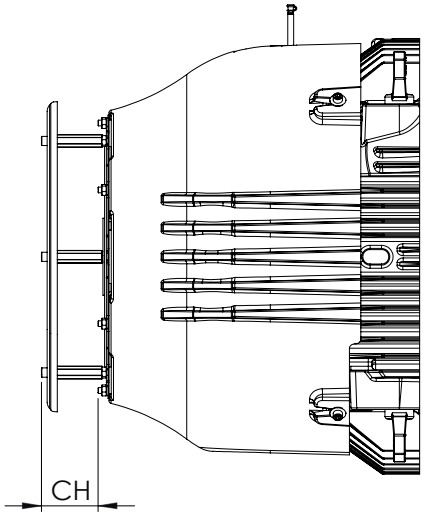
15.5 External Motor Dimensions with Forced Ventilation

Frame	N° poles	LC
315 H/G	2	1837
	4 - 8	1867
355 J/H	2	1966
	4 - 8	2036
400 L/K	2	1991
	4 - 8	2031
400 J/H	2	2141
	4 - 8	2181
450 L/K	2	2190
	4 - 8	2270
450 J/H	2	2340
	4 - 8	2780



15.6 Drip Cover Height

Frame	CH [mm]
315 H/G	99
355 J/H	
400 L/K	128
400 J/H	
450 L/K	
450 J/H	

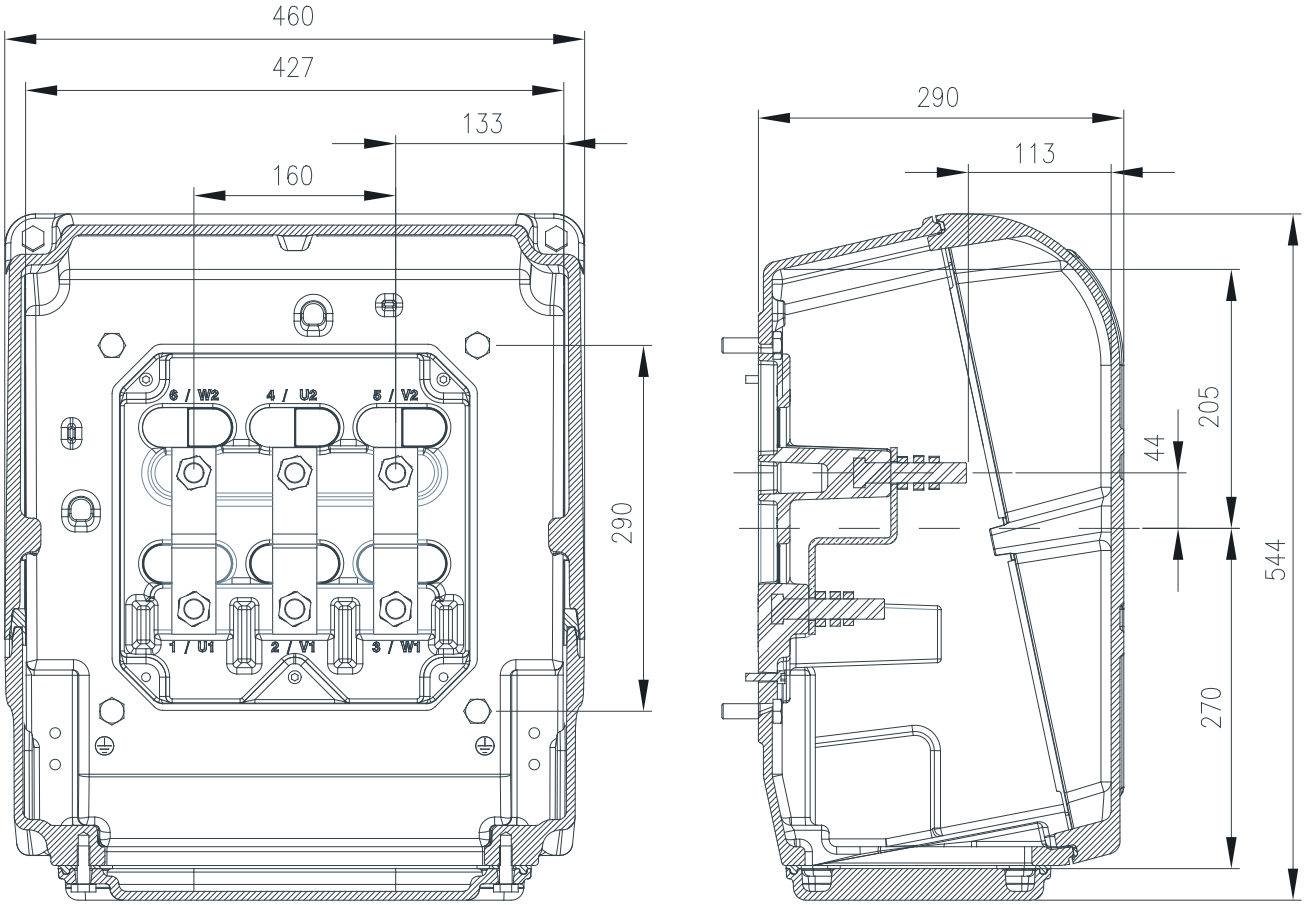


16. Terminal Boxes

The terminal boxes can be manufactured in cast iron FC-200, the same material used in the frame and endshields, or manufactured in steel plate. Below see the external dimensionals and some technical features.

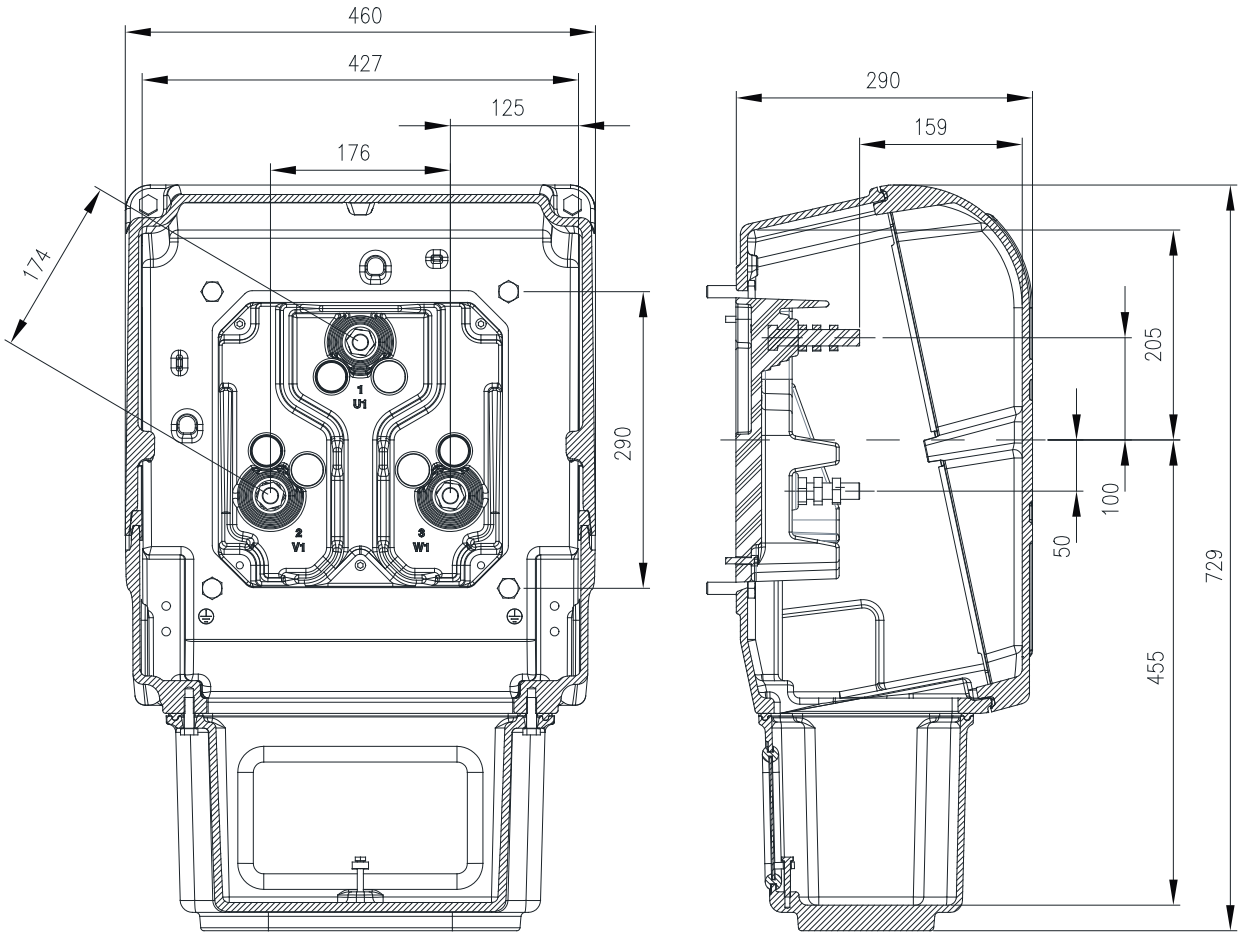
16.1 Cast Iron Terminal Boxes

16.1.1 Iron 01



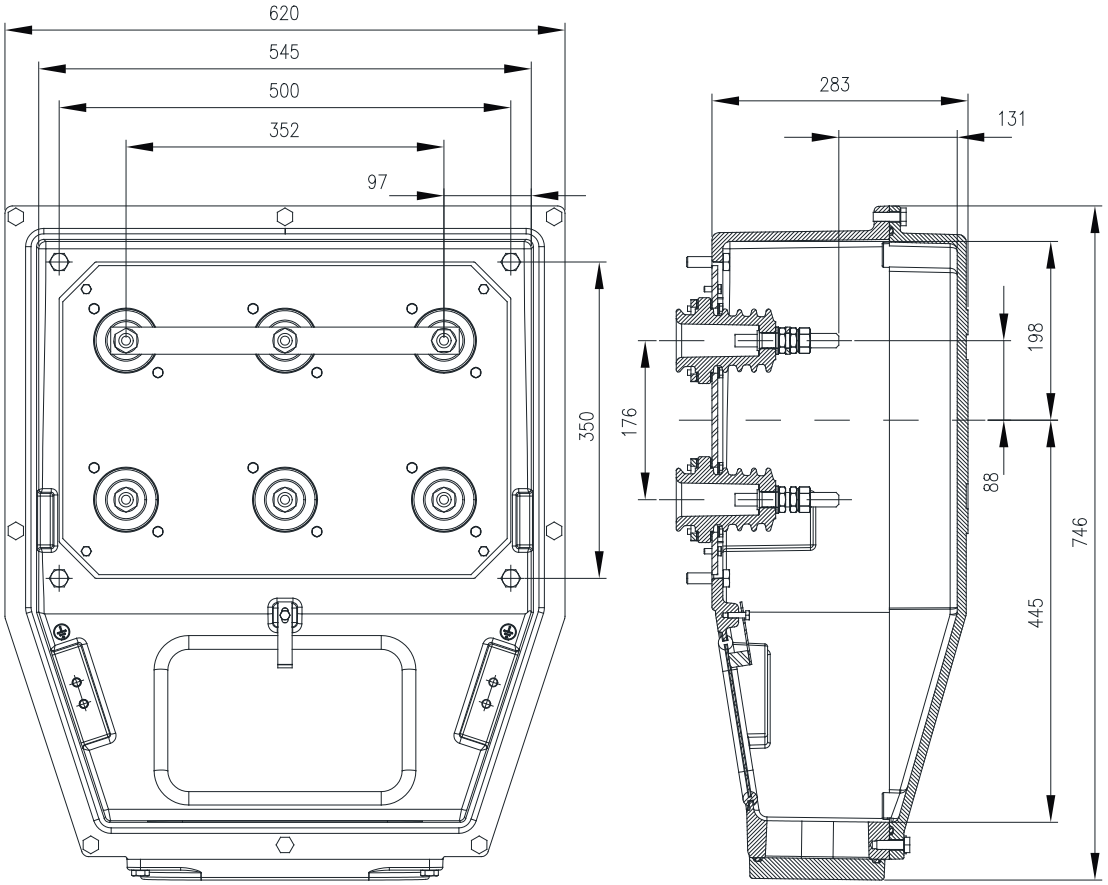
Technical data	
Maximum quantity of leads	1 per phase
Entry plates for leads designation	Type 01
Internal volume	51 dm³
Connecting bolt	M16 x 2
Tightening torque of the terminals	30 Nm
Grounding terminal	Internal
Approximate weight	75 kg
Degree of protection	IP66
General data	
Minimum teminal box thickness	7 mm
Rotate in steps of 90°	Yes

16.1.2 Iron 02



Technical data	
Maximum quantity of leads	1 per phase
Entry plates for leads designation	Type 02
Internal volume	64.7 dm³
Connecting bolt	M16 x 2
Tightening torque of the terminals	30 Nm
Grounding terminal	Internal
Approximate weight	75 kg
Degree of protection	IP66
General data	
Minimum teminal box thickness	7 mm
Rotate in steps of 90°	Yes
Pressure relief device in the back of the terminal box in case of short circuit	

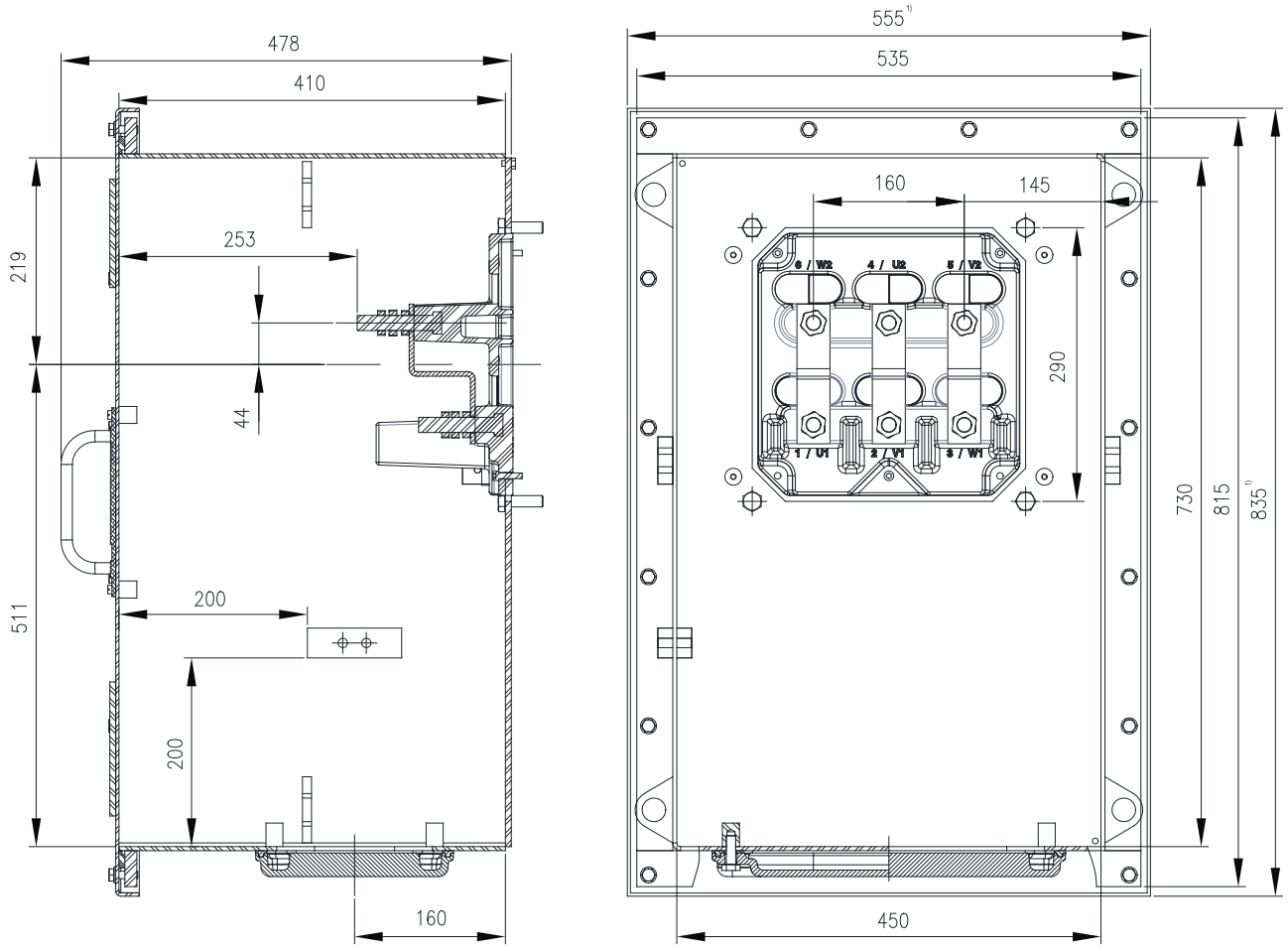
16.1.3 Iron 05



Technical data	
Maximum quantity of leads	2 per phase
Entry plates for leads designation	Type 03
Internal volume	81.2 dm³
Connecting bolt	M16 x 2
Tightening torque of the terminals	30 Nm
Grounding terminal	Internal
Approximate weight	120 kg
Degree of protection	IP66
General data	
Minimum teminal box thickness	8 mm
Rotate in steps of 90°	Yes
Pressure relief device in the back of the terminal box in case of short circuit	

16.2 Steel Plate Terminal Boxes

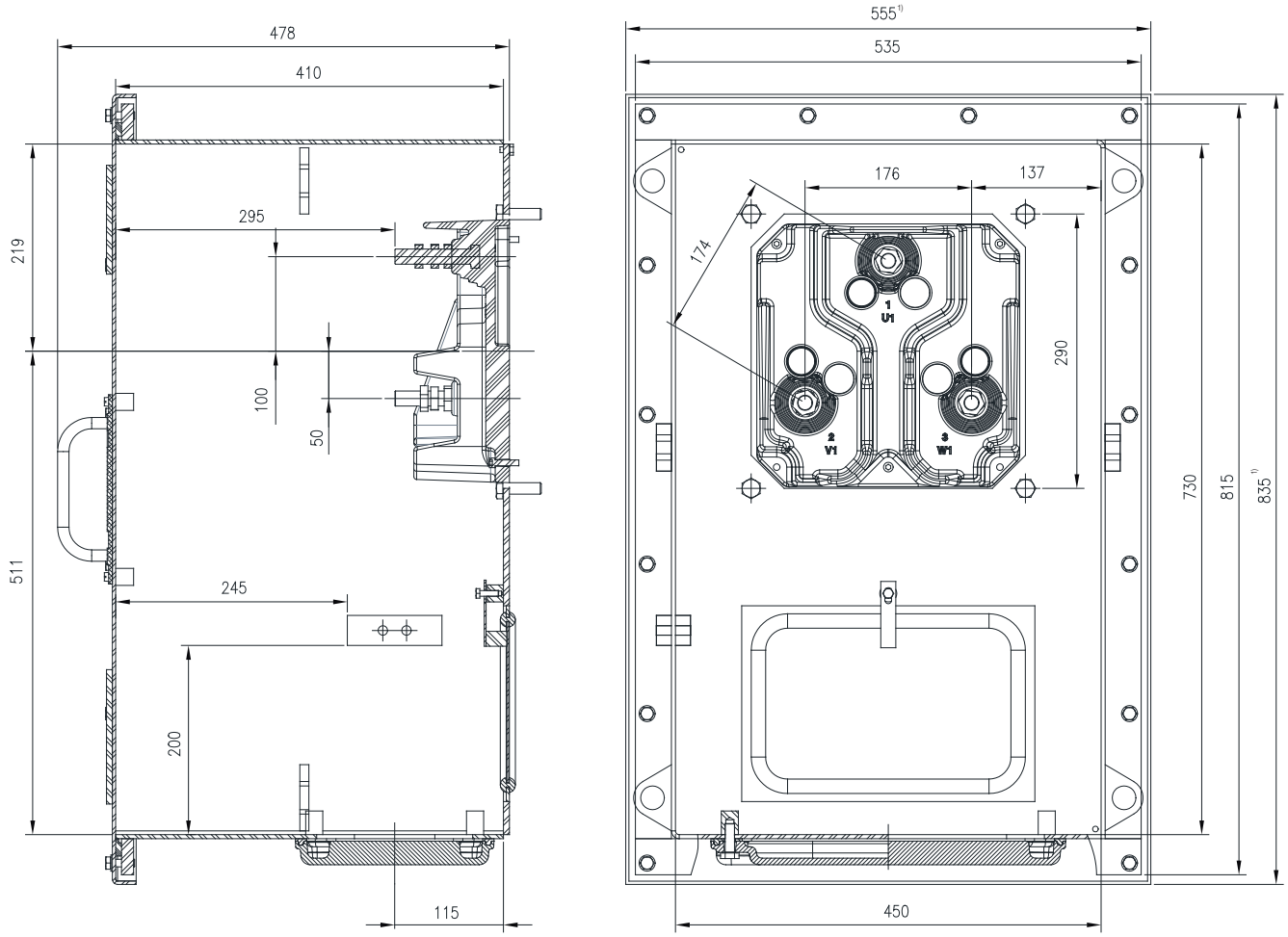
16.2.1 Steel 01



Note: 1) Dimensions of the terminal box cover.

Technical data	
Maximum quantity of leads	1 per phase
Entry plates for leads designation	Type 01
Internal volume	131.4 dm³
Connecting bolt	M16 x 2
Tightening torque of the terminals	30 Nm
Grounding terminal	Internal or external
Approximate weight	95 kg
Degree of protection	IP66
General data	
Minimum teminal box thickness	3.35 mm
Rotate in steps of 90°	Yes
With eyebolts	4 eyebolts

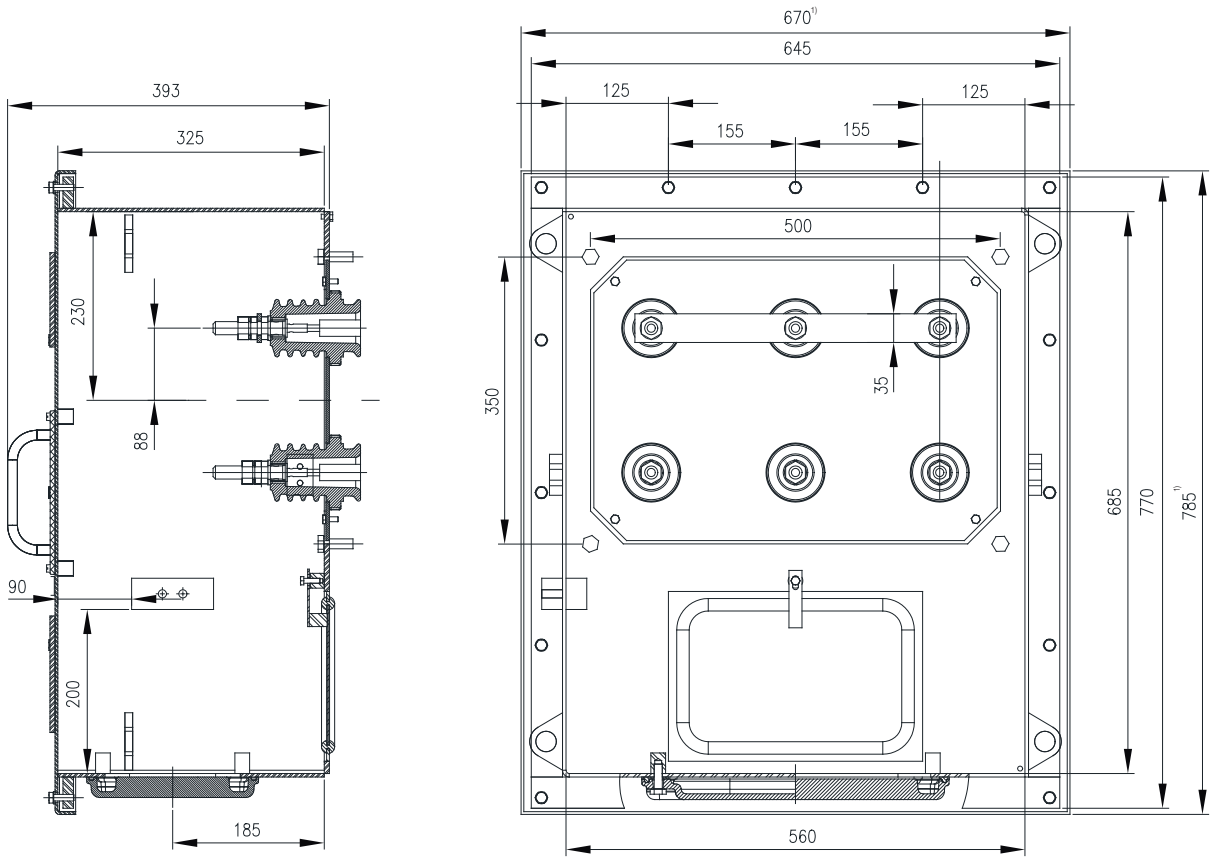
16.2.2 Steel 02



Note: 1) Dimensions of the terminal box cover.

Technical data	
Maximum quantity of leads	1 per phase
Entry plates for leads designation	Type 01
Internal volume	134.7 dm³
Connecting bolt	M16 x 2
Tightening torque of the terminals	30 Nm
Grounding terminal	Internal or external
Approximate weight	90 kg
Degree of protection	IP66
General data	
Minimum teminal box thickness	3.35 mm
Rotate in steps of 90°	Yes
With eyebolts	4 eyebolts
Pressure relief device in the back of the terminal box in case of short circuit	Yes

16.2.3 Steel 11



Note: 1) Dimensions of the terminal box cover.

Technical data	
Maximum quantity of leads	2 per phase
Entry plates for leads designation	Type 01
Internal volume	124.7 dm³
Connecting bolt	M16 x 2
Tightening torque of the terminals	30 Nm
Grounding terminal	Internal or external
Approximate weight	100 kg
Degree of protection	IP66
General data	
Minimum teminal box thickness	3.35 mm
Rotate in steps of 90°	Yes
With eyebolts	4 eyebolts
Pressure relief device in the back of the terminal box in case of short circuit	Yes

17. Packaging

W50 motors in frames 315 to 400 are packaged in wooden pallets (see figure 62), following the dimensions, weights and volumes opposite.

Frame [1)]	External height (m)	External width (m)	External lenght (m)	Weight (kg)	Volume (m³)
315 H/G	25	132	190	102.2	0.627
355 J/H		135	210	110.6	0.709
400 L/K		140	220	115.5	0.770
400 J/H					

Note: 1) Applicable for motor with side terminal boxes.

Figure 62 - Wooden pallet.

For frame 450, the motors are packaged in steel pallets. Dimensions, weights and volumes are in tables opposite.

Frame [1)]	External height (m)	External width (m)	External lenght (m)	Weight (kg)	Volume (m³)
450 L/K	24	145	250	98.1	0.870
450 J/H					

Note: 1) Applicable for motor with side terminal boxes.

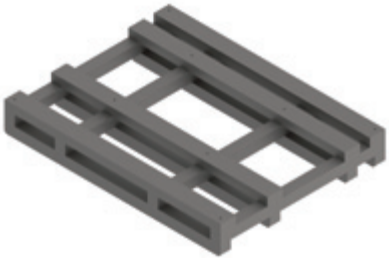
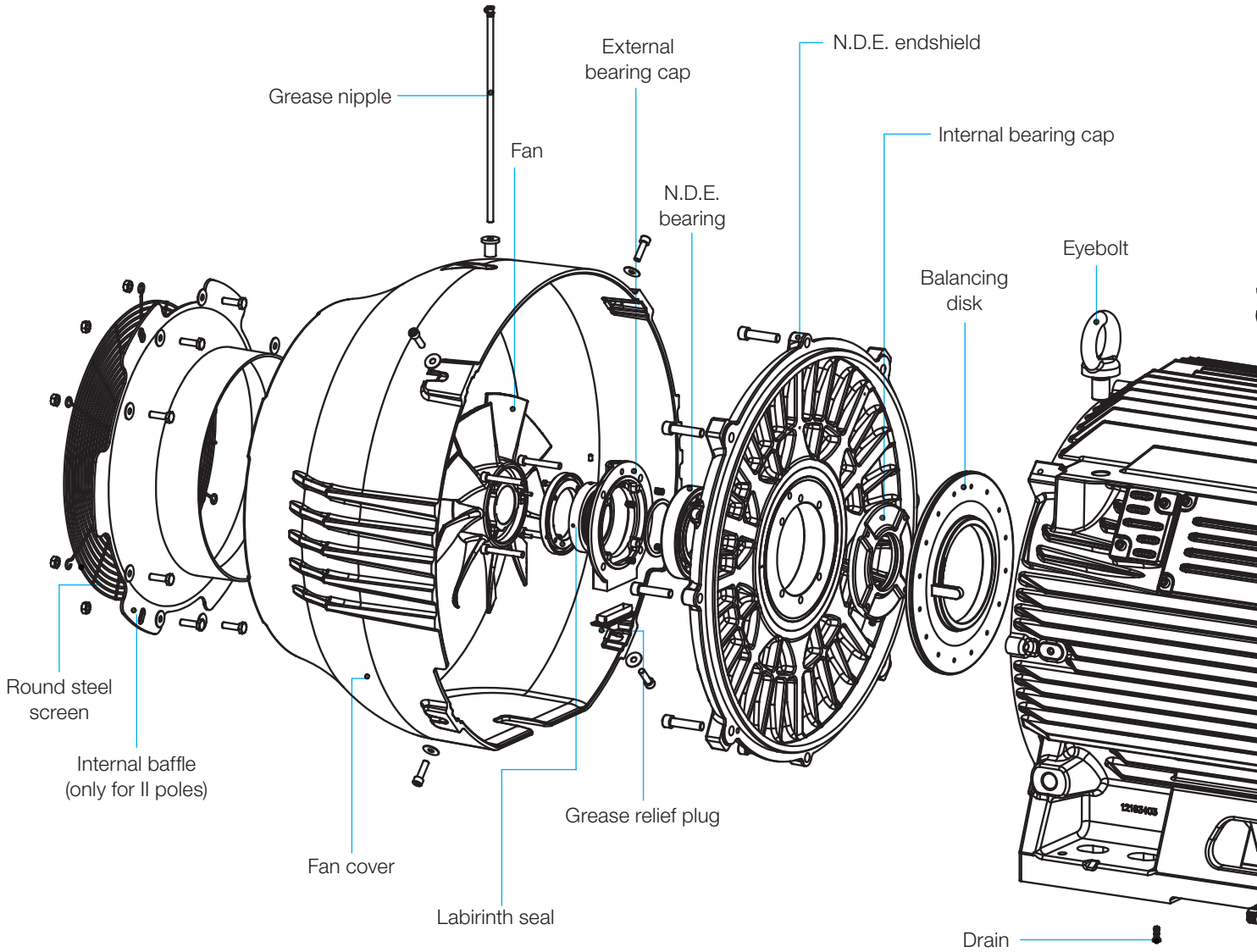
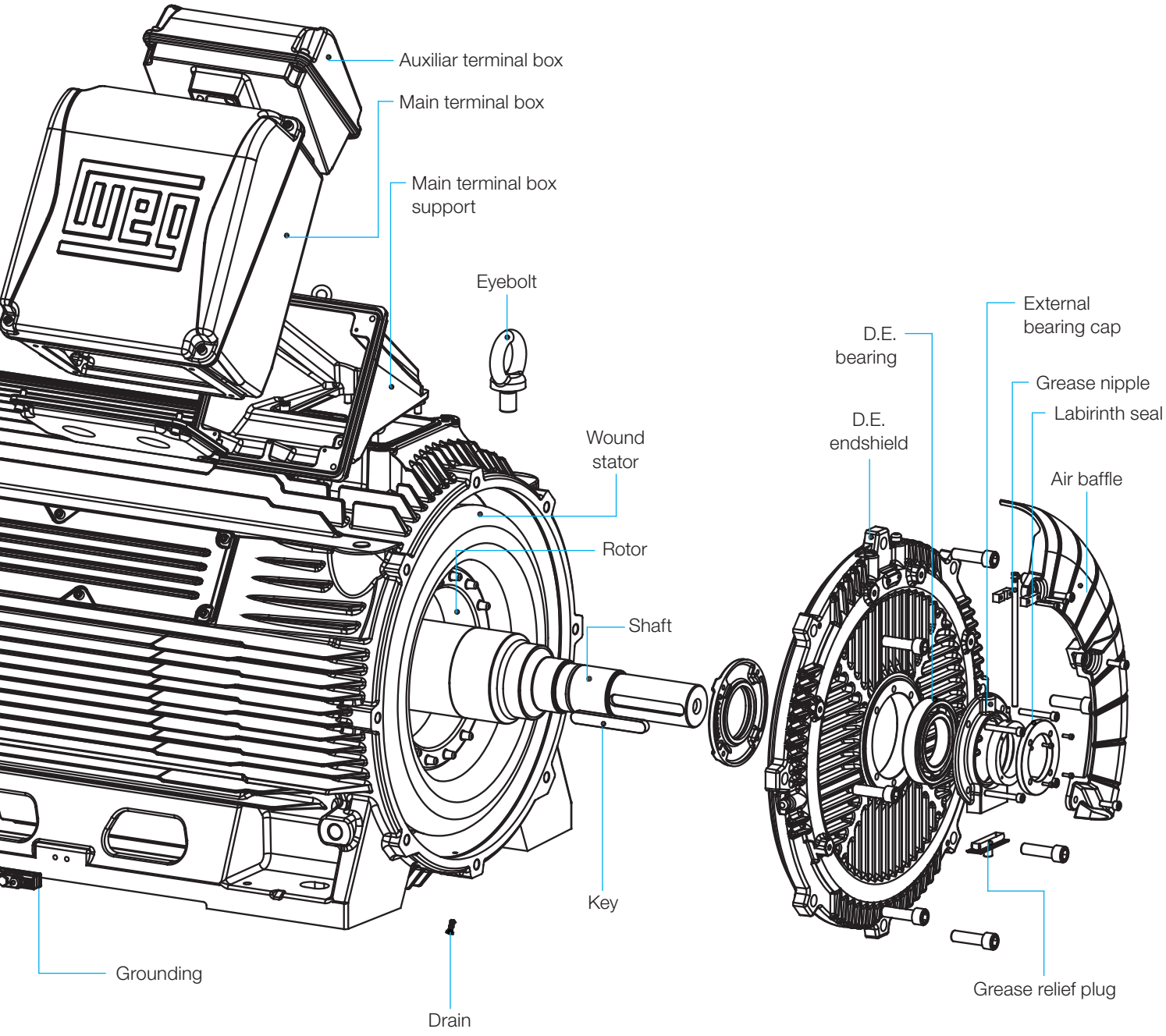


Figure 63 - Steel crates.

18. Spare Parts




Auxiliar terminal box
Main terminal box
Main terminal box support
Eyebolt
External bearing cap
D.E. bearing
Grease nipple
Labirinth seal
D.E. endshield
Wound stator
Air baffle
Rotor
Shaft
Key
Grounding
Drain
Grease relief plug

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