5.3.3 Oil Mist lubricated bearings

The motor must be stored in horizontal position. Lubricate the bearings with ISO VG 68 mineral oil in the amount indicated in the Table 5.2 (this is also valid for bearings with equivalent dimensions). After filling with oil, rotate the shaft by hand, at least five revolutions)
During the storage period, remove the shaft locking device (if any) and rotate the shaft by hand every week, at least five revolutions, stopping it at a different position from the original one. Reinstall the shaft locking device every time the motor has to be moved. If the motor is stored for a period of over two years, the bearings must be replaced or removed, washed according to manufacturer instructions, checked and relubricated according to item 8.2.

Table 5.2 - *Amount of oil per bearing*

Bearing size	Amount of oil (ml)	Bearing size	Amount of oil (ml)
6201	15	6309	65
6202	15	6311	90
6203	15	6312	105
6204	25	6314	150
6205	25	6315	200
6206	35	6316	250
6207	35	6317	300
6208	40	6319	350
6209	40	6320	400
6211	45	6322	550
6212	50	6324	600
6307	45	6326	650
6308	55	6328	700

The oil must always be removed when the motor has to be handled. If the oil mist system is not operating after installation, fill the bearings with oil to prevent bearing rusting. During the storage period, rotate the shaft by hand, at least five revolutions, stopping it at a different position from the original one. Before starting the motor, all bearing protection oil must be drained from the bearing and the oil mist system must be switched ON.

5.3.4 Sleeve bearing

The motor must be stored in its original operating position and with oil in the bearings. Correct oil level must be ensured. It should be in the middle of the sight glass. During the storage period, remove the shaft locking device and rotate the shaft by hand every month, at least five revolutions, and at 30 rpm, thus achieving an even oil distribution inside the bearing and maintaining the bearing in good operating conditions. Reinstall the shaft locking device every time the motor has to be moved.
If the motor is stored for a period equal or longer than the oil change interval, the oil must be replaced, according to Item 8.2, before starting the operation.

If the motor is stored for a period longer than the oil change interval, or if it is not possible to rotate the motor shaft by hand, the oil must be drained and a corrosion protection and dehumidifiers must be applied.

5.4. INSULATION RESISTANCE

We recommend measuring the winding insulation resistance at regular intervals to follow-up and evaluate its electrical operating conditions. If any reduction in the insulation resistance values are recorded, the storage conditions should be evaluated and corrected, where necessary.

5.4.1. Insulation resistance measurement

We recommend measuring the winding insulation resistance at regular intervals to follow-up and evaluate its electrical operating conditions. If any reduction in the insulation resistance values are recorded, the storage conditions should be evaluated and corrected, where necessary.

The insulation resistance must be measured in a safe environment.

ENGLISH

The insulation resistance must be measured with a megohmmeter. The machine must be in cold state and disconnected from the power supply.

To prevent the risk of an electrical shock, ground the terminals before and after each measurement. Ground the capacitor (if any) to ensure that it is fully discharged before the measurement is taken.

It is recommended to insulate and test each phase separately. This procedure allows the comparison of the insulation resistance between each phase. During the test of one phase, the other phases must be grounded. The test of all phases simultaneously evaluates the insulation resistance to ground only but does not evaluate the insulation resistance between the phases.
The power supply cables, switches, capacitors and other external devices connected to the motor may considerably influence the insulation resistance measurement. Thus all external devices must be disconnected and grounded during the insulation resistance measurement.
Measure the insulation resistance one minute after the voltage has been applied to the winding. The applied voltage should be as shown in Table 5.3.

Table 5.3 *- Voltage for the insulation resistance*

Winding rated voltage (V)	Testing voltage for measuring the insulation resistance (V)
< 1000	500
1000 - 2500	500 - 1000
2501 - 5000	1000 - 2500
5001 - 12000	2500 - 5000
> 12000	5000 - 10000

The reading of the insulation resistance must be corrected to 40 °C as shown in the Table 5.4.

Table 5.4 *- Correction factor for the insulation resistance corrected to 40 °C*

Measuring temperature of the insulation resistance (°C)	Correction factor of the insulation resistance corrected to 40 °C	Measuring temperature of the insulation resistance (°C)	Correction factor of the insulation resistance corrected to 40 °C
10	0.125	30	0.500
11	0.134	31	0.536
12	0.144	32	0.574
13	0.154	33	0.616
14	0.165	34	0.660
15	0.177	35	0.707
16	0.189	36	0.758
17	0.203	37	0.812
18	0.218	38	0.871
19	0.233	39	0.933
20	0.250	40	1.000
21	0.268	41	1.072
22	0.287	42	1.149
23	0.308	43	1.231
24	0.330	44	1.320
25	0.354	45	1.414
26	0.379	46	1.516
27	0.406	47	1.625
28	0.435	48	1.741
29	0.467	49	1.866
30	0.500	50	2.000

The motor insulation condition must be evaluated by comparing the measured value with the values indicated in Table 5.5 (corrected to 40 °C):

***Table 5.5** - Evaluation of the insulation system*

Limit value for rated voltage up to 1.1 kV (MΩ)	Limit value for rated voltage above 1.1 kV (MΩ)	Situation
Up to 5	Up to 100	Dangerous. The motor can not be operated in this condition
5 to 100	100 to 500	Regular
100 to 500	Higher than 500	Good
Higher than 500	Higher than 1000	Excellent

The values indicated in the table should be considered only as reference values. It is advisable to log all measured values to provide a quick and easy overview on the machine insulation resistance.
If the insulation resistance is low, moisture may be present in the stator windings. In this case the motor should be removed and transported to a WEG authorized Service Center for proper evaluation and repair (This service is not covered by the warranty). To improve the insulation resistance through the drying process, see section 8.4.

6. INSTALLATION

The insulation resistance must be measured in a safe environment.

Check some aspects before proceeding with the installation:

1. Insulation resistance: must be within the acceptable limits. See item 5.4.
2. Bearings:
   If the motor is installed without running immediately, proceed as described in item 5.3.
3. Operating conditions of the start capacitors: If single-phase motors are stored for a period of over two years, it is recommended to change the start capacitors before motor starting since they lose their operating characteristics.
4. Terminal box:
   a. the inside of the terminal box must be clean and dry;
   b. the contacts must be correctly connected and corrosion free. See 6.9 and 6.10;
   c. the cable entries must be correctly sealed and the terminal box cover properly mounted in order to ensure the degree of protection indicated on the motor nameplate.
5. Cooling: the cooling fins, air inlet and outlet openings must be clean and unobstructed. The distance between the air inlet openings and the wall should not be shorter than ¼ (one quarter) of the diameter of the air inlet. Ensure sufficient space to perform the cleaning services. See item 7.
6. Coupling: remove the shaft locking device (where fitted) and the corrosion protection grease from the shaft end, including the grounding brush area, and flange immediately before installing the motor. See item 6.4.
7. Drain hole: the motor must always be positioned so the drain hole is at the lowest position (If there is any indication arrow on the drain, the drain must be so installed that the arrow points downwards).
   Motors supplied with rubber drain, threaded drain or any other open/close drain plugs must be opened periodically to allow the exit of condensed water. For environments with high water condensation levels and motor with degree of protection IP55, the drain plugs can be mounted in open position (see Figure 6.1).
   For motors with degree of protection IP56, IP65 or IP66, the drain plugs must remain at closed position (see Figure 6.1), being opened only during the motor maintenance procedures.
   The drain system of motors with Oil Mist lubrication system must be connected to a specific collection system (see Figure 6.12).

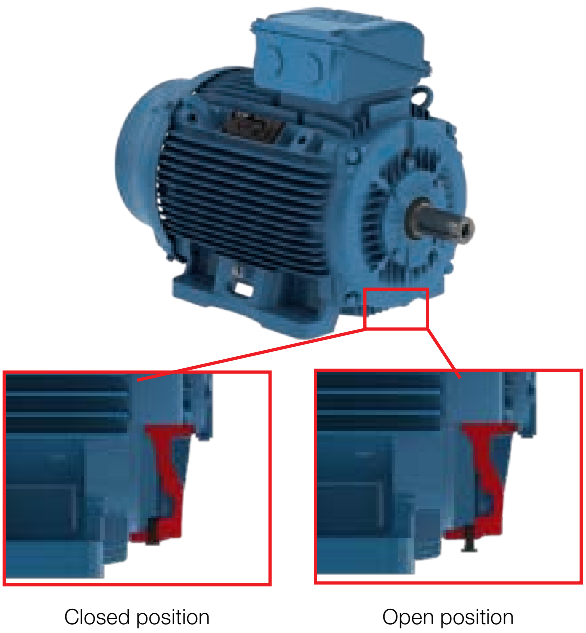


Figure 6.1 *- Detail of the rubber drain plug mounted in closed and open position*

ENGLISH

8.Additional recommendations:
a. Check the direction of motor rotation, starting the motor at no-load before coupling it to the load;
b. Vertical mounted motors with shaft end down must be fitted with drip cover to protect them from liquids or solids that may drop onto the motors;
c. Vertical mounted motors with shaft end up should be fitted with water slinger ring to prevent water ingress inside the motor.
d. The fixing elements mounted in the threaded through holes in the motor enclosure (for example, the flange) must be properly sealed.

Remove or fix the shaft key before starting the motor.

Changes on the motor construction (features), such as installation of extended grease fittings or modification of the lubrication system, installation of accessories at alternative locations, etc., can be carried out only after prior written consent from WEG.

6.1. FOUNDATIONS

The foundation is the structure, structural element, natural or prepared base, designed to withstand the stresses produced by the installed equipment, ensuring safe and stable performance during operation. The foundation design should consider the adjacent structures to avoid the influences of other installed equipment and no vibration is transferred through the structure

The foundation must be flat and its selection and design must consider the following characteristics:

a) The features of the machine to be installed on the foundation, the driven loads, application, maximum allowed deformations and vibration levels (for instance, motors with reduced vibration levels, foot flatness, flange concentricity, axial and radial loads, etc. lower than the values specified for standard motors).

b) Adjacent buildings, conservation status, maximum applied load estimation, type of foundation and fixation and vibrations transmitted by theses constructions.

If the motor is supplied with leveling/alignment bolts, this must be considered in the base design.

Please consider for the foundation dimensioning all stresses that are generated during the operation of the driven load.
The user is responsible for the foundation designing and construction.

The foundation stresses can be calculated by using the following equations (see Figure 6.2):

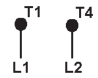
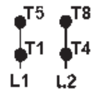
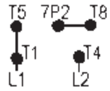
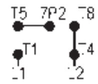
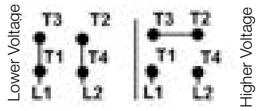
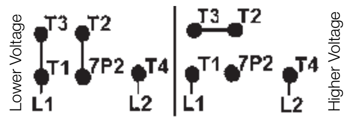
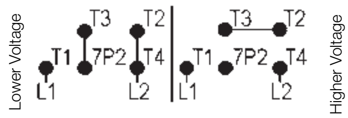
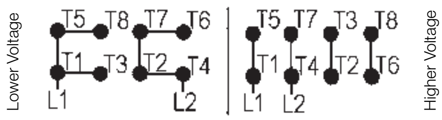
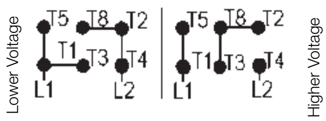
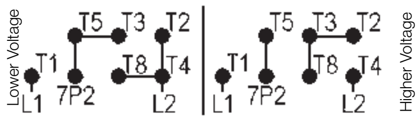
$$F_1 = 0,5 * g * m - (4 * T_b / A)$$
$$F_2 = 0,5 * g * m + (4 * T_b / A)$$

Where:

F_1 and F_2 = lateral stresses (N);
g = gravitational acceleration (9,8 m/s^2);
m = motor weight (kg);
T_b = breakdown torque (Nm);
A = distance between centerlines of mounting holes in feet or base of the machine (end view) (m).

ENGLISH

Table 6.3 *- Typical connection diagram for single-phase motors.*

Voltage	Direction of Rotation	Thermal Protection	Type	Connection diagram
Single	CW or CCW	With or Without	Run / Permanent Capacitors Two values	
	Both	Without		 To reverse rotation invert T5 with T8.
		Phenolic Thermal Protector		 To reverse rotation invert T5 with T8
		Thermostat		 To reverse rotation invert T5 with T8
Double	CW or CCW	Without	Run / Permanent Capacitors Two values or Split Phase	
		Phenolic Thermal Protector		
		Thermostat		
	Both	Without	Split Phase (without capacitor)	To reverse rotation invert T6 with T8. To reverse rotation invert T7 with T5. 
			Run / Permanent Capacitors Two values	To reverse rotation invert T5 with T8. 
		Phenolic Thermal Protector	Split Phase (without capacitor)	To reverse the rotation invert T7 with T5 and T6 with T8. To reverse rotation invert T7 with T5. 
			Run / Permanent Capacitors Two values	To reverse rotation invert T5 with T8. 
		Thermostat	Split Phase (without capacitor)	To reverse the rotation invert T7 with T5 and T6 with T8. To reverse rotation invert T7 with T5. 
			Run / Permanent Capacitors Two values	To reverse rotation invert T5 and T8 

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Terminal box

Proceed as follows to remove the terminal box cover and to disconnect/connect the power supply cables and the cables of the accessory devices:

- Ensure that during the screw removal the terminal box cover does not damage the components installed inside the terminal box;
- If the terminal box cover is fitted with lifting eyebolt, lift the terminal box cover always by its lift eyebolt;
- If motors are supplied with terminal blocks, ensure the correct tightening torque on the motor terminals as specified in Table 8.12;

For flying leads motors, do not push the overlength of leads into the motor in order to prevent that they touch the rotor.

- Ensure that the cables do not contact sharp edges;
- Ensure that the original IP degree of protection is not changed and is maintained as indicate on the motor nameplate. The power supply cables and the control cables must always be fitted with components (cable glands, conduits) that meet the applicable standards and regulations of each country;
- Ensure that the pressure relief device is in perfect operating condition, if provided. The seals in the terminal box must be in perfect condition for reuse and must be reinstalled correctly to ensure the specified degree of protection;
- Ensure the correct tightening torque for the securing bolts of the terminal box cover as specified in Table 8.12.

Table 8.12 *- Tightening torque for the securing bolts [Nm]*

Screw type and seal	M4	M5	M6	M8	M10	M12	M14	M16	M20
Hex bolt/hex socket bolt (rigid joint)	-	3,5 to 5	6 to 9	14 to 20	28 to 40	45 to 70	75 to 110	115 to 170	230 to 330
Combined slotted screw (rigid joint)	1,5 to 3	3 to 5	5 to 10	10 to 18	-	-	-	-	-
Hex bolt/hex socket bolt (flexible joint)	-	3 to 5	4 to 8	8 to 15	18 to 30	25 to 40	30 to 45	35 to 50	-
Combined slotted screw (flexible joint)	-	3 to 5	4 to 8	8 to 15	-	-	-	-	-
Terminal blocks	1 to 1,5	2 to 4 1)	4 to 6,5	6,5 to 9	10 to 18	15,5 to 30	-	30 to 50	50 to 75
Grounding terminals	1,5 to 3	3 to 5	5 to 10	10 to 18	28 to 40	45 to 70	-	115 to 170	-

Note: 1) For 12-pin terminal block, apply the minimum torque of 1.5 Nm and maximum torque of 2.5 Nm.

DRYING THE STATOR WINDING INSULATION

Dismantle the motor completely. Remove the end shields, the rotor with the shaft, the fan cover, the fan and the terminal box before the wound stator with the frame is transferred to the oven for the drying process. Place the wound stator in the oven heated to max. 120 °C for two hours. For larger motors a longer drying time may be required. After the drying process has been concluded, allow the stator to cool to room temperature. Measure the insulation resistance again as described in item 5.4. Repeat the stator drying process if the required insulation resistance does not meet the values specified in Table 5.3. If the insulation resistance does not improve despite several drying processes, evaluate the causes of the insulation resistance drop carefully and an eventual replacement of the motor winding may be required. If in doubt contact WEG.

To prevent electrical shock, discharge the motor terminals immediately before, and after each measurement. If the motor is equipped with capacitors, these must be discharged before beginning any repair.

Pacemaker users and unqualified personnel shall not open WMagnet and WQuattro motors, because high energy magnets are used.