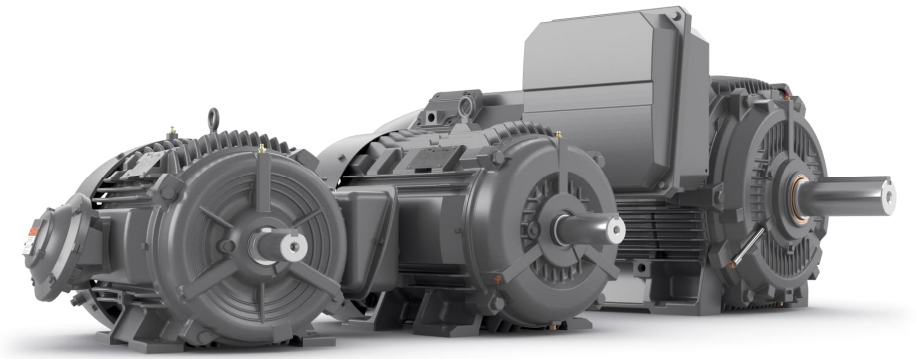


Horizontal and vertical induction motors

Motor type GP, SD, XP, LP, HP, HS
Low-Voltage NEMA motor.

Operating Instructions Manual

Edition	05/2023

ENGLISH

Introduction 1

IMPORTANT

The information contained herein is general in nature and not intended for specific application purposes. It does not relieve the user from responsibility to use sound practices in application, installation, operation and maintenance of the purchased motor. **ABB** reserves the right to make changes in the specifications shown herein or to make improvements at any time without notice or obligations.

NOTE

These instructions do not purport to cover all details or variations in equipment, nor provide information for every possible contingency to be met in installation, operation, or maintenance. Should further information be desired about a specific topic or inconvenience, contact the local **ABB** sales office. The contents of this instruction manual shall not become part of or modify any prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of **ABB**. The warranty contained in the contract between the parties is the sole warranty of **ABB**. Any statements contained herein do not create new warranties or modify the existing warranty.

Configurator for drive technology

You can find product information on your motor according to ErP Directive 2019/1781 in the configurator for drive technology. If you enter the motor order number (MLFB) you will find technical documentation such as data sheets, characteristic curves, and CAD drawings for your motor.

https://new.abb.com/motors-generators/es-mx

IMPORTANT

The procedures described in this document must be carried out by qualified personnel.

For the purpose of this manual a qualified person is one who is familiar with the installation, construction and operation of the motor and the hazards involved. In addition, this person has the following qualifications:

(a) Is trained and authorized to de-energize, energize, clear, ground, and tag circuits and equipment in accordance with established safety practices.

(b) Is trained in the proper care and use of protective equipment such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety practices.

(c) Is trained in rendering first aid.

Safety Information 2

Philosophy in the signaling of warnings and dangers

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol; notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger

DANGER
Indicates that death or severe personal injury will result if proper precautions are not taken.
WARNING
Indicates that death or severe personal injury may result if proper precautions are not taken.

CAUTION
Indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
Indicates that property damage can result if proper precautions are not taken.

If several levels of danger are present, the most strict safety instructions are always used in each case. If in a safety instruction with alarm warning triangle of possible personal injuries, the same password can also be a warning about possible material damage.

Indications for motors for potentially explosive atmospheres.

Qualified personnel

The product described in this documentation may be operated only by personnel qualified for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

For proper use of ABB motors, consider the following.


WARNING

ABB motors may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by **ABB**. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks:

All names identified by ® are registered trademarks of **ABB**. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

The content of this publication is reviewed periodically; if necessary, possible corrections are included in the next edition.

WARNING:

Dangerous voltages and rotating parts can cause serious personnel injury, equipment damage and even death. Always disconnect and properly ground the motor before maintenance. Read and understand this instruction manual before using the motor.

Maintenance should be performed only by qualified personnel. Use only original **ABB** spare parts in the repair of the motor. Do not modify the motor with non-original **ABB** spare parts. Follow all safety instructions contained in this instruction manual.

Safe handling

Workplace safety depends on the attentiveness, care, and common sense of the personnel who install, operate, and maintain the machine. In addition to the safety measures cited, as a matter of principle, the use of caution is necessary when you are near the machine. Always pay attention to your safety. Also observe the following to prevent accidents:

- General safety regulations applicable in the country where the machine is deployed.
- Manufacturer-specific and application-specific regulations
- Special agreements made with the operator
- Separate safety instructions supplied with the machine
- Safety symbols and instructions on the machine and its packaging

PARTS UNDER ELECTRICAL TENSION

WARNING

Live parts

Electric machines contain live parts.

Fatal or severe injuries and substantial material damage can occur if the covers are removed or if the machine is not handled, operated, or maintained properly.

- Always observe the “five safety rules" (Page 14) when carrying out any work on the machine.
- Only remove the covers using the methods described by these operating instructions.
- Operate the machine properly.
- Regularly and correctly maintain the machine.

PARTS OR ROTARY ELEMENTS

WARNING

Electric motors contain dangerous rotating parts.

Fatal or severe injuries and substantial material damage can occur if the covers are removed or if the motor is not handled, operated, or maintained properly.

- Only remove the covers using the methods described by these operating instructions.
- Operate the motor properly.
- Perform regular maintenance on the motor.
- Secure free-standing shaft ends.

HOT SURFACES

WARNING

Electric motors have hot surfaces. Do not touch these surfaces. They could cause burns.

- Allow the motor to cool before starting work on the motor.
- Only remove the covers using the methods described by these operating instructions.
- Operate the motor properly.

UNHEALTHY SUBSTANCES

CAUTION

Chemical substances required for the setup, operation and maintenance of motors can present a health risk.

Poisoning, skin damage, cauterization of the respiratory tract, and other health damage may result.

● Read the information in these operating instructions and the product information supplied by the manufacturer.

● Observe the relevant safety regulations and wear the personal protective equipment specified.

CAUTION

Flammable substances

Chemical substances required for the setup, operation and maintenance of motors may be flammable.

Burns and other damage to health and material may result.

● Read the information in these operating instructions and the product information supplied by the manufacturer.

● Observe the relevant safety regulations and wear the personal protective equipment specified.

WARNING

Interference to electronic devices caused by electrical power equipment

Electrical power equipment generates electric fields during operation. Potentially lethal malfunctions can occur in medical implants, e.g. pacemakers, in the vicinity of electrical power equipment. Data may be lost on magnetic or electronic data carriers.

● It is forbidden for people with pacemakers to enter the vicinity of the motor.

● Protect the personnel working in the plant by taking appropriate measures, such as erecting identifying markings, safety barriers and warning signs and giving safety talks.

● Observe the nationally applicable health and safety regulations.

● Do not carry any magnetic or electronic data media.

XP Safety instructions, explosion-proof motors

Note

Potentially explosive atmospheres are more dangerous, so it is necessary to observe very carefully the indications indicated with the following symbol:

XP

Description 3

Application area

The three-phase machines of this series are used as industrial drives. They are designed for a wide range of drive applications both for line operation as well as in conjunction with frequency converters. They are characterized by their high-power density, extreme robustness, long service life and outstanding reliability.

Intended use of the motors

These motors are intended for industrial installations and comply with the harmonized standards of the series NEMA MG1. When used in a non-industrial application, precautions must be put into place to provide safety to pedestrian traffic. Consult with local governing agencies for minimum requirements.

Motors directive

Low-voltage motors are components designed for installation in machines in accordance with the current Machinery Directive. Commissioning is prohibited until it has been absolutely identified that the end product is in conformance with this locals Directives.

Applicable standards

On the nameplate you will find the prescriptions and standards taken as the basis for sizing and testing the motor and are based on the **NEMA MG-1** standard.

Degree of protection

The machine has a type of protection to the degree indicated as stamped on the rating plate and can be installed in dusty or humid environments to the degree indicated.

Environmental conditions

Limit values for the standard version

Relative humidity for ambient temperature T_{amb} 40 °C	max. 55 %
Ambient temperature	-20 °C a +40 °C
Installation altitude	≤ 1000 m
Air with normal oxygen content, usually	21% (V/V)

Note: The environmental conditions mentioned on the rating plate supersede this table.

XP Degree of protection in XP motors

The motor has a type of protection as stamped on the rating plate and can be installed in dusty or humid environments.

Storage and Internal Handling 4

Storage

CAUTION

Before any handling, make sure you have your personal safety equipment such as shoes, gloves, girdle and lenses because if these preventive measures are not taken, physical damage may occur.

If the motor will not be used immediately, it should be stored addressing the following recommendations:

1. The storage location should be a clean, ventilated, free of vibrations. Relative humidity must be lower than 60%, and temperature variation must not be such that causes condensation in the windings. If the storage conditions are conducive to condensation, the motor must be drained regularly through the plug located in the lower part of both end-shields minimum every 6 months. Precautions must be taken in order to avoid entry of dust, insects or rodents into the motor. The motor must not be exposed to corrosive atmosphere or substances. If the motor will be

stored for more than three months, please consult your local **ABB** sales office.

2. Prior to the shipment, motors are lubricated with the proper amount and grade of grease to provide six months of satisfactory service under normal operation and conditions. During storage, the motor shaft should be turned by hand several (30RPM for 15 seconds) every 3 months to evenly distribute the grease inside the bearings and avoiding marks in the bearings, please refer to the long-term storage instructions for more details.
3. Prolonged storage periods reduce the useful life of the bearing grease. In case of prolonged storage, the duration of use of bearing grease is shortened and must be re-lubricated (See LUBRICATION chapter).
4. Measure and register the winding insulation every month (See INSULATION RESISTANCE MEASUREMENT).
5. It should not be stored in open areas and without protection against rain, breeze, and humidity.
6. To protect with greater importance the parts those are mechanized with suitable lubricants to inhibit the oxidation of these.
7. Stack only if indicated and in the maximum quantities indicated on the packaging. (Any deviations to the indicated pallets are possible causes of damage to the user's account).

WARNING

Risk of dropping and swinging when transported suspended

If you transport the motor suspended from cables or ropes, the cables or ropes can break, e.g. as a result of damage. Further, if not adequately attached, the motor can swing. This can result in death, serious injury, or material damage.

- Use additional eye bolts, suitable lifting equipment for transport and during installation.
- Two cables alone must be able to carry the complete load.
- Prevent the lifting equipment from sliding by appropriately securing it.

WARNING

Toppling over or slipping of the motor

The motor can slide or topple over if it is not correctly lifted or transported. This can result in death, serious injury, or material damage.

- Use all the lifting eyes on the machine.
- When using the lifting eyes on the machine, do not attach any additional loads or weight. The lifting eyes are only designed for the weight of the machine itself.
- Any eyes bolts that are screwed in must be tightly fastened.
- Eyebolts must be screwed in right up to their supporting surface.
- Comply with the permissible eyebolt loads.
- When necessary, use suitably dimensioned transport equipment, for example hoisting straps and load restraints.

Additional notes

When lifting the machines for transport, only lift them in a position that corresponds to their basic construction type.

The motors are packed in different ways depending on how they are transported and their size. If not otherwise contractually agreed, the packaging corresponds to the packing guidelines according to ISPM (International Standards for Phytosanitary Measures).

Comply with the images shown on the packaging. Their meaning is as follows:

XP Explosion hazard during start up, if stored incorrectly

WARNING

Risk of explosion due to damaged sealing materials

Storing the motor at temperatures that do not fall within the specified limits can damage the material of the seals and cause them to fail. As a result, a potentially explosive gaseous atmosphere can enter the machine and be ignited during start up. Explosions can occur. This can result in death, serious injury or material damage.

The materials used are specially designed for the temperature range required by the customer. Do not store the motor in conditions that lie outside the specified temperature limits. The relevant temperature limits are specified on the rating plate.

Storage temperature

Permissible temperature range**: -20 °C to +50 °C**
The relative humidity of the air should be less than **60 %.**
In this case, refer to the machine rating plate for data on the coolant temperature and installation altitude.

Preparing for Use 5

Actions are taken in the factory to ensure the motor arrives at its destination in optimal conditions. If you detect packaging damage when receiving your motor, immediately submit a claim to the carrier and notify your local **ABB** sales office.
Once the motor has been unpackaged, inspect it to make certain no damage has occurred in conduit box, fan cover or any part of the equipment. Put special attention in optional additional devices such as tachometers, brakes, blowers or auxiliary conduit boxes.
Inspect all the screws and fittings that might have come loose during shipping. Rotate the shaft by hand to be sure it rotates freely. If it is suspected that the motor

has not been transported with sufficient care, in such a way that it might have suffered structural damage; end-shields or motor covers must be removed to check for internal damage.

CAUTION

1. - Before any handling, make sure you have your personal safety equipment such as shoes, gloves, girdle and eyes protection. Failure to do so could result in injury.

2. - Make sure before any handling that the motor to be prepared for its use is of the appropriate environment and complies with the specifications according to the installation area.

3. - Explosion proof motors are designed to comply with the U.L. label service procedure manual, therefore the repair or maintenance work of this type of motors must be performed only by technical personnel authorized by **ABB** or in U.L. certified service centers. Violation of any of the above will invalidate the U.L. certification as well as the **ABB** warranty.

4.- Check the storage time of the equipment as well as verify the conditions of the bearing grease and, if necessary, change or renew it before starting the installation.

5. - Take care when removing the package because the packaging could have staples, nails and screws with sharp parts that could physically hurt the installer.

6. - For the disposal of packaging materials, the laws of your area should be consulted regarding the separation of materials and their final disposal.

7. - Check the free movement or rotation of the arrows before energizing the motor.

XP

WARNING

Explosion hazard in case of modifications to the machine

Substantial modifications to the motor are not permitted – or may only be performed by the manufacturer. Otherwise an explosion can occur in an explosive atmosphere. This can result in death, serious injury or material damage.

Please contact the **ABB** Service Center, if necessary.

Note

The increased level of danger in hazardous areas demands that you pay particular attention to the notes marked with: (XP)

(XP) Motor for installation

Only use explosion-protected motors in appropriate areas in accordance with directive applied in this location.

(XP) Indication for paint repairing the paint on explosion-proof motors

In the repair of paint damage on explosion-proof motors, the following warnings must be observed.

⚠ WARNING

Explosion hazard caused by incorrect painting

The paint coat can become electrostatically charged where there is a thick coat. Electrostatic discharges can occur. There is a risk of explosion if potentially explosive mixtures are also present at this moment. This can result in death, serious injury or material damage.

Electromagnetic compatibility verification

If the torque levels are very unequal (e.g. when a reciprocating compressor is being driven), a non-sinusoidal machine current will be induced whose harmonics can have an impermissible effect on the supply system and cause impermissible interference emissions as a result.

Converter application

- If operated with a frequency converter, the emitted interference varies in strength, depending on the design of the converter (type, interference suppression measures, and manufacturer).
- Avoid that the specified limit values stipulated for the drive system (consisting of the motor and converter) are exceeded.
- You must observe the EMC information from the manufacturer of the converter.
- The most effective method of shielding is to conductively connect a shielded motor supply cable to the metal terminal box of the machine (with a metal screw connection) over a large surface area.
- On motors with integrated sensors (e.g. PTC Thermistors), disturbance voltages caused by the converter may occur on the sensor cable.

Immunity to interference

The motors in principle fulfill the requirements of interference immunity in conformity with the standards applied in their location. If the motors with integrated sensors (e.g. PTC thermistors) are used, the operating company must ensure sufficient interference immunity by selecting a suitable sensor signal lead (Possibly with shielding, connected in the same way as the motor feeder cable) and a suitable evaluation unit.

Mounting motor and lifting 6

CAUTION

Before any handling, make sure you have your personal safety equipment such as shoes, gloves, girdle and lenses because if these preventive measures are not taken, physical damage may occur.

Although the motors are robust in construction, these must be handled with care. Dropping or jarring a motor can seriously damage its components. When lifting, use a device with sufficient load capacity.

WARNING

Instructions for lifting

1.- Before starting any activity of lifting, make sure the eye bolt or screw are firmly held and fully in contact with the surface of the motor.

Correct

Incorrect

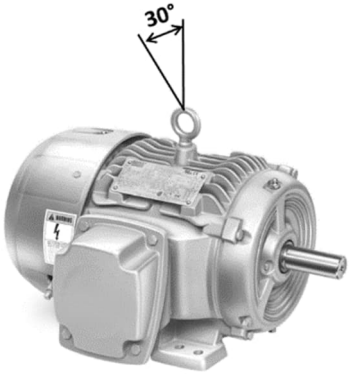
2.- Motors must not be lifted by the shaft, but by the eyebolt, which has been designed to lift only the motor.

3.- It is forbidden to move loads over the worker height, loads should be transported closed to the floor.

4. - Before lifting check stability of load.

For horizontal motors with a lifting eyebolt

For these Motors, the maximum angle resulting in the lifting should **NOT** be greater than 30 degrees relative to the vertical axis.



For vertical motors with two lifting hooks

For vertical motors both lifting hooks must be used **simultaneously**, also a device should be used to separate and keep in vertical sense the lifting element (Like chains) to avoid possible motor damage.

DANGER

For the proper lifting or lifting with safety of the motor, since due to its weight and length it is very important to use special devices with the adequate capacity (3 TN) to avoid a serious accident and / or that can go so far as to produce death. (Check in data plate the weight).

These lifting devices called Joke (Separating steel bar) of an appropriate length and steel chains or cable are **VERY NECESSARY** for a **SIMULTANEOUS** lifting and safely for their lifting points. (See next figure).

Any other form of lifting or with other devices than those specified in this manual will be incurring in a lack of **SAFE MOTOR HANDLING** and **ABB** will not be responsible for non-compliance with these warnings.

Suitable lifting device (Yoke Type) for motors with two lifting points.

WARNING

The equipment used to lift the motor must be in good condition. While lifting the motor, keep at a safe distance in order to avoid personnel injuries.

CAUTION

If your motor is equipped with special devices such as tachometers, brakes, blowers and/or auxiliary conduit boxes, these should never be used as an anchoring point to lift the motor; otherwise the motor or such equipment can suffer severe damage.

Electrical connection 7

DANGER

1.- The installation, operation and maintenance of the motor shall be carried out by qualified personnel, who must be familiar with codes, guidelines and applicable local regulations. Personnel must use the adequate tools and be experienced in installation, operation and maintenance of electric motors.

2.- Before any handling, make sure you have your personal safety equipment such as shoes, gloves, girdle and lenses because if these preventive measures are not taken, physical damage may occur.

3.- Verify that electrical supply matches with motor specifications as printed on the motor nameplate. Make connections for each lead as indicated in the connections diagram on nameplate. Failure to comply these instructions could result in severe damage to the motor, surrounding equipment or personnel injury.

4. - To facilitate the electrical connection, the conduit box can be rotated in 90° degrees increments. Avoid having the wire output towards drive end.

5.- Check that the machine really is in a no-voltage condition.

6.- Establish a safe protective conductor connection before starting any work.

7.- Verify that the power lines are **COMPLETELY DISCONNECTED** when making connections to the motor.

8.- Before starting up, check that the electrical connections are in accordance with the instructions on the wiring diagram located on the motor nameplate.

XP Explosion-protected motors are equipped with terminal boxes with type of protection to explosion proof or flame. Please note in this regard design, connection options and spare parts. Have authorized **ABB** workshops perform any repairs.

XP Connecting converters

WARNING

Machine overheating

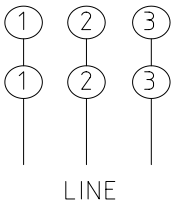
Operating explosion-protected machines at the converter without using the appropriate protective equipment can result in death or severe injury.

- Always use Thermal Protectors monitoring when operating explosion-protected machines at the converter. Tripping units according to directive 94/9/EC are always necessary when using Thermal Protectors monitoring.

IMPORTANT

Some motors can be manufactured with six leads, in three pairs. However, this does not indicate that the motor is suitable for "Delta-Wye" connection. If it is, it will be indicated in the nameplate.

A motor with six leads shall be connected as follows:



1. Leads marked with the same number must be connected to each other 1-1, 2-2 & 3-3.
2. Three pairs will be obtained. Each one shall be connected to a different phase of the electrical supply.

IMPORTANT

If the motor was requested with a special connection, do not connect the motor as described above. For further information and/or technical support, please contact your local **ABB** sales office.

Note: All motor leads are marked according to NEMA MG1 standard, connections must be done as diagram shown in nameplate, take in account that phases 1, 2 and 3 correspond to phases U, V and W respectively.

The motor might be supplied with an internal device protecting the windings against overheating and/or overload. The type of the protection device is specified in the nameplate. A RTD (Resistance Temperature Detector) is placed on or inside the windings to record its temperature. Leads of this device must be connected to another device capable of interpreting the RTD signal to shut down the electrical supply in case of overheating.

Overload protection devices act directly on the power circuit. They use bimetallic materials which deform when a high and constant current passes through them. E.g: The KLIXON's.

CAUTION

If the motor is equipped with an electrical heating element, it must have: an adequate power supply, overload protection, and switching devices that ensure that the heating element **ONLY OPERATES WHEN THE MOTOR IS NOT ENERGIZED**.

If the motor is equipped with tachometer, safety and connection instructions from the tachometer manufacturer shall be addressed before starting the motor for the first time.

Installation and Start Up 8

DANGER

1.- The installation, operation and maintenance of the motor shall be carried out by qualified personnel, who must be familiar with codes, guidelines and applicable local regulations. Personnel must use the adequate tools and be experienced in installation, operation and maintenance of electric motor.

2.- Before any handling, make sure you have your personal safety equipment such as shoes, gloves, girdle and lenses because if these preventive measures are not taken, physical damage may occur.

3.- When working with voltage levels up to 600 V.A.C. and moving parts (even at low speeds) there is the possibility to suffer serious injuries or death.

Before any repair or maintenance service, use electrical or mechanical locks to prevent a sudden or unwanted startup of the motor.

CAUTION

1.- The motor shall be installed in an environment adequate for its design and application features. Otherwise, the motor will have a deficient performance and a reduced life. For further information please consult your local **ABB** sales office.

2.- The motor foundation must rigidly support (Screwed) all four feet in the same plane in order to avoid vibrations and maintain a correct alignment between the motor shaft and the load. Shims can be used under the motor feet. For direct drive, accurate alignment is 0.004 inch/ft. (radius to dial indicator = one foot). Any change in shims requires rechecking alignment.

3.- When installing flat belt pulley, V-belt sheave, spur or helical pinion or chain drives, be certain that they are within **NEMA-MG1** limitations. Refer to **NEMA-MG1**, Section II part 14.7 and Section II part 14.42. Protective covers must be installed to prevent unwanted contact between moving parts and other objects or personnel.

4.- Ensure that any optional supplementary motor monitoring equipment has been connected correctly and is functioning as it should.

5.- It ensures a long life of the bearings maintaining proper alignment, adequate tension in the band or chain and good lubrication at all times.

6.- Ensure that the cooling airflow is not obstructed or diminished in any way and have enough free space for the correct operation of the motor.

7.- Prevent the air expelled by neighboring equipment from being immediately sucked in again.

8.- For motors with a vertical type construction with air entry from above, prevent the ingress of foreign bodies and water in the air entry openings.

CAUTION

Danger caused by inappropriate fasteners material

If screws of an incorrect property class have been selected or if have been fastened to an incorrect tightening, they may break or become loose. This will cause the motor to move, which could damage the bearing. The motor could smash into de motor enclosure and motor parts could be flung out of place. This can result in death, serious injury or material damage

- Comply with the required property classes for screws connections.
- Tighten the screwed connections to de specified tightening torques.

Tightening torques in motors

All screws tightening torques for screws in threaded joints of bearing shields, housing and bearing caps should have the following torques according to the size of the screw.

Hexagonal screw head grade 5

Diameter (Inches)	Threads per inch	Minimum (Nm)	Nominal (Nm)	Maximum (Nm)
5/32"	32	3.1	3.5	3.8
3/16"	24	4.4	4.9	5.4
1/4"	20	10.7	11.9	14.2
5/16"	18	21.7	24.2	29.2
3/8"	16	38.2	42.5	47.0
7/16"	14	61.0	67.9	75.0
1/2"	13	92.0	103.0	114.0
5/8"	11	184.0	204.0	224.4
3/4"	10	322.0	358.0	393.0
7/8"	9	450.0	490.0	520.0

Torque values for fan covers and deflector assembly

Hexagonal screw head grade 5

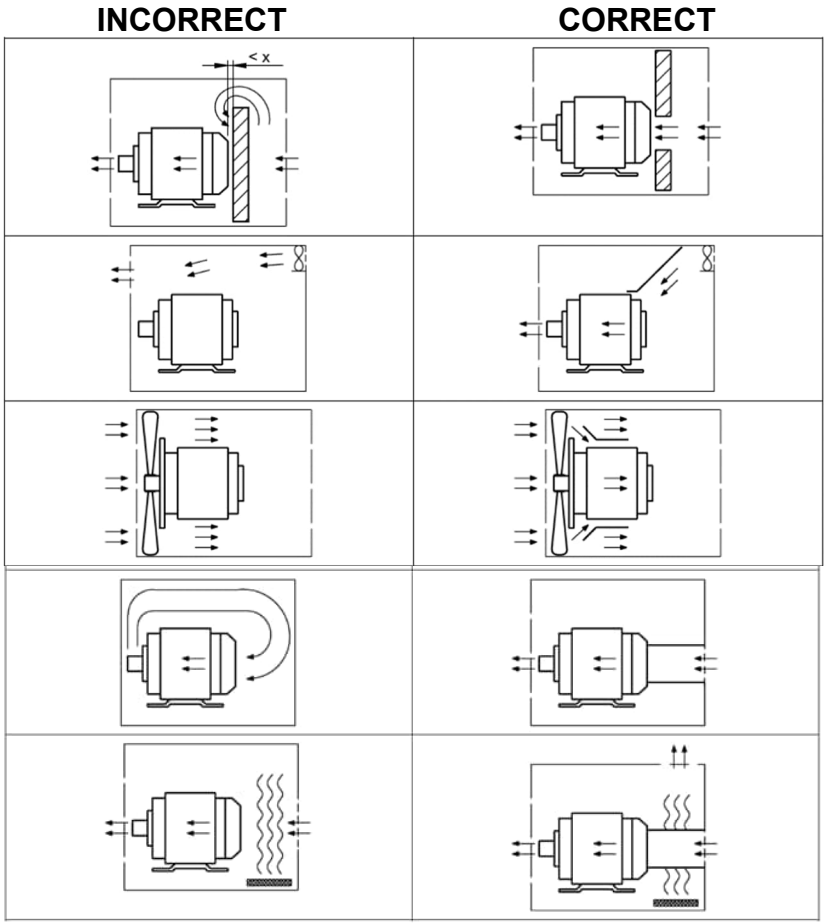
Diameter (Inches)	Threads per inch	Minimum (Nm)	Nominal (Nm)	Maximum (Nm)
3/16"	24	**3.0**	**3.5**	**3.8**
3/16"	24	**3.0**	**3.5**	**3.8**
3/16"	24	**3.5**	**4.0**	**4.5**
1/4"	20	**8.0**	**10.0**	**13.0**
3/8"	16	**20.0**	**24.0**	**28.0**
3/8"	16	**25.0**	**30.0**	**35.0**
7/16"	14	**50.0**	**55.0**	**60.0**
7/16"	14	**55.0**	**60.0**	**65.0**
3/8"	16	**18.0**	**22.0**	**26.0**
3/8"	16	**20.0**	**24.0**	**28.0**
3/8"	16	**25.0**	**30.0**	**35.0**

Torque values for terminal boxes assembly

Hexagonal screw head grade 5

Diameter (Inches)	Threads per inch	Minimum (Nm)	Nominal (Nm)	Maximum (Nm)
1/4"	20	**5.0**	**7.5**	**10.5**
5/16"	18	**11.0**	**14.0**	**17.0**
3/8"	16	**16.0**	**20.0**	**24.0**
1/2"	13	**21.0**	**26.0**	**30.0**

Cooling and Air Guidance



Minimum dimension X=5” for the distance between neighboring modules and the air intake of the motor.

CAUTION

All wiring to the motor, size of the conductors, drivers, protection devices, motor starters, grounding devices and any other electrical equipment must be in accordance with NOM-001-SEDE, NEC and the National Electrical Code and all local regulations.

Electrical supply must meet the values of voltage and frequency described in the motor nameplate. The motor will operate successfully under running conditions at rated load with a variation in the voltage or the frequency up to the following:

1. When the variation in the voltage value does not exceed 10% above or below the specified in the motor nameplate, with all phases balanced.
2. When the variation in the frequency value does not exceed 5% above or below the specified in the motor nameplate.
3. When the sum of the voltage and the frequency values does not exceed 10% above or below the specified in the motor nameplate (provided frequency value variation does not exceed the 5%).

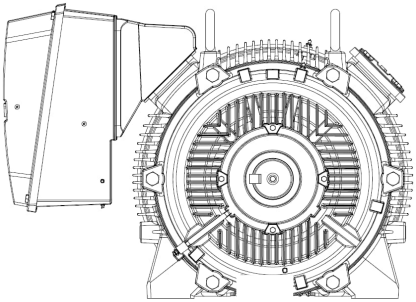
However, performance within these voltage and frequency variations will not necessarily be in accordance with the standards established for operation at rated voltage and frequency.

WARNING

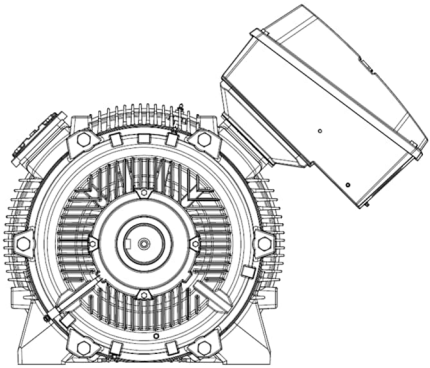
Any electrical maneuver must be carried out by qualified personnel, taking the following warnings into consideration:

1. The electrical supply shall be disconnected and preventive action against accidental connection must be taken.
2. The motor shall be properly connected to a grounding circuit. Refer to the NOM-001-SEDE and NEC or any other local electrical code.

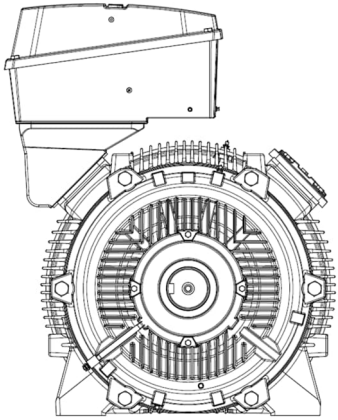
Mounting options for terminal box in motors type SD200



Standard mounting



Mounting to 45°



Top mounting on motor

WARNING

Danger of falling components in the change of mounting type F1 to F2 either box on the motor or box at 45 °

To change the configuration from F1 to F2 in frame 500 and given the weight of the components to be moved, the following safety instructions must be carried out.

Connection box base

2.1.- Remove the two lateral plastic plugs that are on the sides of the connection box base where the threaded holes are for this purpose.

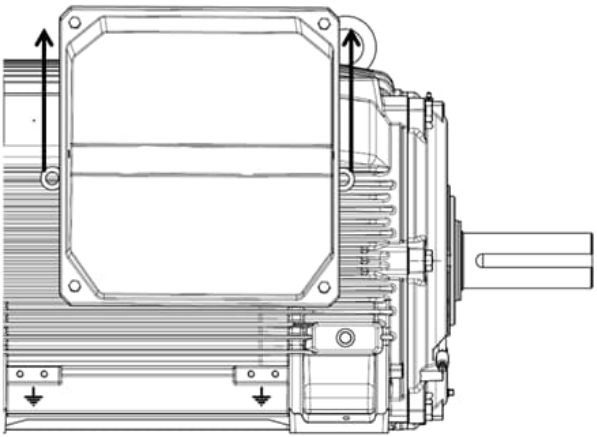
2.2.- Place a 3/8 "-16 NC eye bolt on each side of the connection base. (See the following figure)

2.1.- Once the two eyebolts are in place, proceed to slightly tighten the lifting system by slings and / or chains. (Optional).

2.2.- Proceed to remove all the fixing screws of the base with the housing until its complete release and move slowly to the other side of the motor for its placement and proceed to fix in its new position.

2.3.- Once the base has been placed in its new location remove the two eyebolts and replace the protective plastic plugs.

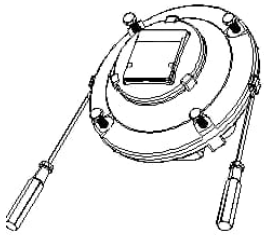
Use eyebolts in placed laterally to the terminal base for removal and change of position F1 to F2.



XP ⚠ CAUTION

Do not insert screwdrivers or wedges between the base and the cover of the explosion proof conduit box. Doing so could affect the tight fit between the base and the cover which may compromise the explosion proof properties of the motor.

XP To remove the cover of the explosion proof conduit box, first loosen the screws, but do not remove them completely in order to prevent the cover from sliding or falling. Then use a couple levers in the notches provided, as shown in the illustration. Failure to follow these instructions might result in serious injuries and/or damage to the motor and its surroundings.



⚠ CAUTION

If the operation of the motor with a variable frequency drive (VFD) is necessary, the readings listed in the standard NEMA-MG1 Section 4 Part 31, or in the NEMA MG2-Section 6 must be addressed. In addition:

1. Variable frequency drive must be properly selected, according to the power of the motor and the conditions of the electrical supply (such as number of phases, voltage, and current capacity).
2. Connect the motor, the VFD, metal conduit and any metal part to an independent grounding circuit. The VFD must be mounted as close as possible to the motor.
3. Use conductor with the appropriate gauge, the shortest possible length and canalized through metal conduits. In addition, the conductors can be shielded to reduce electromagnetic interference with electronic equipment.
4. The operation of a motor with a VFD causes an increase in operating temperature which in turn leads to the deterioration of the insulation on the windings.

WARNING

Always attend the safety instructions of the VFD manufacturer. High AC and DC voltages are present in a VFD even after the VFD is de-energized. See VFD operation manual to avoid personnel injury.
In order not to affect the optimal functioning of the motor-VFD system and to ensure proper insulation; the length of the power leads from the VFD to the motor shall not exceed those listed in *Table 1.1. Maximum power leads length from VFD output to motor*.

Frame Size	230 V	460V	575V
NEMA 143-320	600 ft.	125 ft.	40 ft.
NEMA 360-449	100 ft.	225 ft.	60 ft.

Table 1.1 Maximum power lead length from VFD output to motor.

CAUTION

A proper programming of the parameters of the VFD is of the utmost importance. Please read and understand the VFD manufacturer's instructions manual. Use the data on the motor nameplate. VFD Programming should be performed by qualified personnel only. For further information and/or technical support, please consult your local **ABB** sales office.

If the motor is equipped with tachometer, safety and connection instructions from the tachometer manufacturer shall be addressed before starting the motor for the first time.

XP Measures to take when commissioning explosion-proof motors

After installation or inspections, the following measures are recommended for normal start-up of the machines:

- Start the machine without a load; to do this, close the motor starter protector and do not switch the machine off prematurely.
- You should limit how often you switch the machine off while it is starting up and still running at a slow speed, for checking the direction of rotation or the required dimensions, for example.
- Allow machines to reach a standstill before switching them back on.

Operation 9

Before starting the motor for the first time make sure that all the previously stated recommendations are fulfilled.

WARNING

Before starting the motor, check that all the screws and rotating parts are correctly positioned and tightened. The use of protective covers in rotating parts is suggested. Make sure that the electrical connections are correct, and that

leads are firmly attached and sufficiently insulated for the operating voltage levels.

If a reduced voltage start method is to be used, it is important to consider that the torque output will be lower in the same proportion. For further information and/or technical support on our motor starting solutions, please consult your local **ABB** sales office.

Before starting the motor for the first time, make sure that the recommendations mentioned above are complied with.

WARNING

1.- The first startup of the motor must be done without any load or mechanism connected to motor's shaft. Parameters such as current, voltage, power consumption and temperature shall be measured and compared against nameplate data. Check direction of rotation. If the motor is energized, but this does not start or if vibration, noise or excessive current draw are present, immediately switch off electrical supply. Investigate and correct the failure. If the motor is equipped with roller bearings on the drive end this first startup must be brief in order to avoid damage to the bearings.
2.- The use of electronic devices to achieve soft starts is recommended to avoid high values of current during startup.
3.- If a reduced voltage start method is to be used, it is important to consider that the torque output will be lower in the same proportion. For further information and/or technical support on our motor starting solutions, please consult your local **ABB** sales office.
4.- Check the mechanical operation for noises or vibrations at the bearings and bearing end shields.
5.- Monitoring the electrical and temperature values during initial and subsequent operation to verify correct operation.
6.- Verify in a reasonable period the voltages values of the line (High / Low) and evaluate those conditions.
7.- Verify that the protective guards and hoppers of the parts in movement are well insured to avoid accidents.

CAUTION

Repeated trial starts can overheat the motor and may result in motor burnout (particularly for across the line starting). If repeated trial starts are made, allow sufficient time between trials to allow heat to dissipate from windings and rotor to prevent overheating.

WARNING

Hot surfaces

Electric machines have hot surfaces. Do not touch these surfaces. They could cause burns.

• Allow the machine to cool before starting work on the machine.

• Only remove the covers using the methods described by these operating instructions.

XP

WARNING

Danger of explosion

If the anti-condensation heating is switched on directly after the motor is switched off, the temperature class or the maximum surface temperature of the motor can be exceeded.

In an explosive atmosphere, there is a high risk of an explosion. This can result in death, serious injury or material damage.

Do not switch on the anti-condensation heating for at least one hour after the motor has been switched.

XP

WARNING

Risk of explosion due to excessive bearing temperature

The surface temperature cannot be maintained within the maximum permissible limits if the bearings become too hot. The dust can ignite, resulting in an explosion. This can result in death, serious injury or material damage.

- Always check the bearing temperature.
- In addition to the current-dependent overload protection device located in the three phases of the connecting cable, we recommend that you also monitor the temperature rise in the motor with the aid of the temperature sensors integrated built into the stator winding.

XP

WARNING

Overheating of roller bearing

If roller bearings are not regularly re-greased, local overheating may be possible, and, as a consequence, an explosion in an explosive atmosphere. This can result in death, serious injury or material damage.

- Re-grease the roller bearings regularly according to the lubrication table.
- Implement bearing temperature monitoring if not yet in existence.

Operation temperature

The electric motors still operating under normal conditions reach high temperatures. This is why motors are designed to withstand high temperatures, and although some places may feel hot to the touch, the motor may be operating within the limits. Use a thermocouple to measure the temperature in the winding when there is any concern about it.

The total temperature, not the temperature rise, is the measure of safe operation. Investigate the winding operating conditions. The total temperature should not exceed of:

230°F (110°C) for class “B” insulation
275°F (135°C) for class “F” insulation
302°F (150°C) for class “H” insulation

Safety information for explosion-protected motors in operation

WARNING

Explosion hazard

These explosion-protected machines are not suitable for hybrid explosive environments.
This can result in death, serious injury or material damage.
Use in atmospheres where there is a risk of explosion caused by both gas and dust simultaneously is absolutely prohibited.

Only install motors for Zone 2 in hazardous areas, according to the regulations laid down by the responsible regulatory body. They are responsible for determining the hazard level of each area (division 2 zones).

- If there are no other specifications examination certificates or on the rating plate regarding operating mode and tolerance, electrical machines are designed for continuous duty and normal starting procedures that are performed infrequently and do not result in excessive temperature rise. Only use these machines for the operating mode specified on the rating plate.

Safety instructions for cleaning

To ensure problem-free machine cooling, the air ducts (ventilation grilles, channels, cooling fins, tubes) must be free of pollution.

WARNING

Risk of explosion when cleaning with compressed air

If you clean the machine with compressed air, plastic components may become statically charged and ignite a potentially explosive atmosphere; an explosion can occur. This can result in death, serious injury or material damage.

• Do not use compressed air to clean motors when installed in hazardous zones!

Maintenance 10

CAUTION

Failure to properly maintain the equipment can result in severe personal injury and product failure. The instructions contained herein should be carefully reviewed, understood and followed. If the corrrect tools are not available or a major maintenance is required, it must be carried out only by personnel authorized by **ABB.** Please contact your local **ABB** sales office for more information our comprehensive maintenance solutions.

Following maintenance procedures must be performed regularly:

1. **Bearing lubrication.**
2. **Winding insulation resistance check.**
3. **Cleaning.**

This checklist does not represent an exhaustive survey of maintenance steps necessary to ensure safe operation of the equipment. Particular applications may require further procedures. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local **ABB** sales office.

WARNING

Dangerous voltages are present in the motor which can cause severe personnel injuries. Always disconnect and ground the equipment before maintenance. Maintenance should be performed only by qualified personnel

CAUTION

The use of unauthorized parts in the repair of the equipment, tampering by unqualified personnel, or removal or alteration of guards or conduit covers will result in dangerous conditions which can cause severe personal injury or equipment damage. Follow all safety instructions contained herein.

Lubrication

Prior to shipment, motor bearings are lubricated with the proper amount and grade of grease to provide six months of satisfactory service under normal operation and conditions.

After that period, the motor must be lubricated as recommended in *Table 1.2: Lubrication frequencies,* where, in a general way, time intervals have been established according to the service and atmosphere in which the motor operates. For further information, please consult your local **ABB** sales office.

Lubrication frequency	Service/ Operation Atmosphere
6 Months	Moderate service/ Clean and dry atmosphere
3 Months	Severe service/ Adverse atmospheres, dust, moisture and vibrations

Table 1.2 Lubrication frequencies.

Note: General purpose motors (up to FS250) and low maintenance motors are provided with lubricated for life bearings, these bearings should be replaced at the end of the grease service life.

Grease

For standard motors, grease should be compounded from a Polyurea base and a good grade of petroleum oil. It should be of No. 2 consistency and stabilized against oxidation. Operating temperature range should be from -15°F to +250°F for class “B” insulation, and to +300°F for class “F” and “H”. Most leading oil companies have special bearing greases that are satisfactory.

Insert the new grease to be placed is equivalent and above all, compatible with the original grease.

Lubrication procedure

The motor can be lubricated while running or stopped. It is advisable to do so while the motor is stopped, for which the following procedure must be followed:

1. Take the necessary actions to prevent unexpected starts. **(DISCONNECT THE SYSTEM).** Clean the grease fitting and remove the drain plug from the grease outlet.
2. Remove the old hardened grease from inlets and outlets. Use a stiff wire or rod.
3. If necessary, remove the nipples and fittings, clean, and reinstall.
4. With a low pressure grease gun, add half the required amount of new grease.
5. Run the motor for 5 minutes to distribute the grease. Then stop it and add the rest of the lubricant.
6. Install the drain plug in the grease outlet and wipe away the excess of grease.

CAUTION

Verify motor grease type and only re-lubricate with compatible type of grease. Mixing greases of different bases (lithium, clay, polyurea, etc.) will cause bearing failure or malfunction and should not be done. All non-compatible grease must be removed from the bearings and housings when making a grease change. Excess grease in the motor can cause damage to the bearings; check *Table 1.3 of Grease Quantities*, for the necessary grease quantities according to the motor frame size.

Grease Quantity per End-Shield side (oz)		
NEMA Frame	Drive End.	Opp. Drive End.
140	0.2	0.2
180	0.5	0.5
210	0.6	0.6
250	1.1	1.1
280	1.5	1.5
320	2.5	2.5
360	3.7	3.7
400	5.6	5.6
440	9.4	8.7
S449	9.4	8.7
500	16.4	16.4

Table 1.3 Grease Quantities.

Vertical motors thrust bearings

Top bearings

High external thrust from the driven unit is usually carried by the top bearing or bearings. If replacement is necessary, the new bearing must be the same size and type as the original.
Duplex bearings must also be the same type and mounted in an identical manner. When angular contact type bearings are replaced, the new bearing must have the same thrust capacity.

Bottom bearings

For an adequate lubrication It is important to maintain the lower cavity full of grease at all times.

The re-lubricating procedure for vertical motors is the same as outlined above under “Lubrication procedure”.

The correct replacement bearings are given on the nameplate by AFBMA (Anti-Friction Bearing Manufacturers Association) number.

Insulation resistance measurement

Measure insulation resistance and register it periodically (approx. every 5000 operating hours). A portable insulation meter (Megger) for 500 DCV is the most convenient and safest method. According to IEEE (Institute of Electrical and Electronics Engineers) standards, the insulation resistance at 75°C measured at 500 V.D.C. after one minute should be not less than:

$$\frac{\text{Nominal motor voltage} + 1000}{1000} = \text{Insulation resistance in Mega ohms}$$

This formula is satisfactory for most of the checks. For more information see IEEE standard No. 43 “Recommended Practice for Insulation Resistance Testing of AC Rotating Machinery”.

WARNING

High DC voltage levels are used during this test. Therefore, severe injuries can be caused if tests are not carried out by qualified personnel with adequate tools.

Cleaning and draining

CAUTION

All surfaces of the motor must stay free of oil, dust, dirt, moisture, chemical agents, or any other accumulation that would provoke a faulty cooling of the equipment. For fan cooled motors, it is particularly important to keep the air intake openings free of foreign material. Do not block air outlet or inlet. The motor (excluding explosion proof models) has a removable plug, in the low part of the housing, which allows draining accumulated humidity. Drain regularly.

Additional painting

Please contact your local **ABB** sales office for information about additional painting.

Motor disposition

Your motor has materials that can be recovered or recycled. The right separation of materials helps with an easy recycling of important materials. Leave your equipment or electrical product at a collection point. Contact your local authorities for more information on disposal of electrical equipment.

XP Repair of paint damage

Note

Contact the Service Center before you repair any paint damage. They will provide you with more information about the correct paint system and methods of repairing paint damage.

WARNING

Explosion hazard caused by incorrect painting

The paint coat can become electrostatically charged where there is a thick coat. Electrostatic discharges can occur. There is a risk of explosion if potentially explosive mixtures are also present at this moment. This can result in death, serious injury or material damage.

Repair work

Take into account, in all work carried out on the motor, the general safety instructions.

WARNING

Explosion hazard when carrying out repair work

Repairs are only permissible within the scope of the work described in these operating instructions. Otherwise an explosion can occur in an explosive atmosphere. This can result in death, serious injury or material damage.

For repairs to go beyond this scope, please contact the Service Center.

Explosion hazard due to high temperature at surface

Components within the motor may be hotter than the maximum permissible surface temperature for the enclosure. In an explosive atmosphere, dust can ignite, and an explosion occurs. This can result in death, serious injury or material damage.

• Do not open the motor in an explosive and dusty atmosphere when it is still at normal operating temperature.

• Allow the machine to cool down before opening it.

Replacing bearings

Before to place single shielded bearings, take care to put shielded side of bearings at opposite side of greasing hole. This to ensure the right lubrication of the bearing.

Replacing bearings in explosion-proof motors

● When changing the bearings, renew the sealing rings and only use original **ABB** spare parts.

● For radial sealing rings with dust protection lip (DIN 3760-AS), completely fill the spaces (100%) in the sealing ring as well as in the bearing shield hub with a suitable grease.

Note

For explosion-proof motors, only use spare parts and original repair parts.

WARNING

Danger of falling parts while changing bearings

In large frames and due to the weight of the components to be extracted, the following safety instructions must be carried out.

1.- **Fan cover** It is necessary to use synthetic flat slings with a capacity

greater than 150 kilograms for the adequate lifting of the fan cover.

1.1.- Remove the protective cover from the fan cover and proceed to pass the flat sling so that it completely supports the fan cover.

1.2.- Lightly tighten the lifting system with the sling and proceed to remove the fastening screws of the cap until its complete release.

2.- **Endshields** For the safe extraction of the end shields or C flanges, it will be carried out in the following way:

2.1.- Slightly loosen all the fastening screws with the housing in such a way that when removing one of the upper screws it can be replaced by an eyebolt which will be placed in the hole of the eye using a nut on the opposite side of the eye bolt and fixed.

2.2.- Lightly tighten the lifting system and proceed with the extraction of the rest of the screws with the housing and slowly move the shield outwards until it is completely removed (be careful not to hit the shaft in the extraction).

Spare parts 11

For ordering parts

1. - For orders of spare parts or parts for repair, the following information is needed:

- Name of the piece
- Motor reference and serial number, (It is indicated on the name plate of the motor).

2. - Contact any of our distributors in Mexico, USA and Canada, they are authorized and trained to process your requirement of the parts that need your motor.

3. - Additionally, you can also contact our customer service and support in replacement parts and / or spare parts.

Disposal 12

Introduction

Protecting the environment and preserving its resources are corporate goals of the highest priority for us. Our worldwide environmental management system to ISO 14001 ensures compliance with legislation and sets high standards in this

regard. Environmentally friendly design, technical safety and health protection are always firm goals even at the product development stage.

Recommendations for the environmentally friendly disposal of the machine and its components are given in the following section. Be sure to comply with local disposal regulations.

Preparing for disassembly

Disassembly of the machine must be carried out and/or supervised by qualified personnel with appropriate expert knowledge.

1. Contact a certified waste disposal organization in your vicinity. Clarify what is expected in terms of the quality of dismantling the machine and provision of the components.

2. Follow the five safety rules.

2.1.- Disconnect the system. Also disconnect the auxiliary circuits, for example, anti-condensation heating.

2.2.- Secure against reconnection.

2.3.- Verify absence of operating voltage.

2.4.- Ground and short-circuit.

2.5.- Provide protection against adjacent live parts.

To energize the system, apply the measures in reverse order.

3. Disconnect all electrical connections and remove all cables.

4. Remove all liquids such as oil and cooling liquids. Collect the liquids separately and dispose of them in a professional manner.

5. Detach the machine fixings.

6. Transport the machine to a suitable location for disassembly.

Motor disassembly

Disassemble the motor using the general procedures commonly used in mechanical engineering.

WARNING

Machine parts can fall

1.- The machine is made up of heavy parts. These parts are liable to fall during dismantling. This can result in death, serious injury or material damage.

2.- Before you release any machine parts, secure them so that they cannot fall.

3.- Take care when disassembling the motor since there are sharp parts that can cause bodily injury.

Disposal of components

Components
The machines consist mainly of steel and various proportions of copper and aluminum. Metals are generally considered to be unlimitedly recyclable.
Sort the components for recycling according to whether they are:

- Iron and steel
- Aluminum
- Non-ferrous metal, e.g. windings, the winding insulation is incinerated during copper recycling.
- Insulating materials
- Cables and wires
- Electronic waste

Process materials and chemicals

Sort the process materials and chemicals for recycling according to whether they are for example:

- Oil
- Grease
- Cleaning substances and solvents
- Paint residues
- Anti-corrosion agent
- Coolant additives such as inhibitors, antifreeze or biocides

Dispose of the separated components according to local regulations or via a specialist disposal company. The same applies for cloths and cleaning substances which have been used while working on the motor.

Information according to article 33 of the Reach regulation

This product contains one or several sub products in which the following substance – belonging to the "list of candidates" – exists in a concentration exceeding 0.1 percent by weight.

- CAS No. 7439-92-1, Lead.

Based on the currently available information, we assume that this substance does not represent any risk when correctly used, including its disposal.

Packaging material

- If necessary, contact a suitable specialist disposal company.
- Wooden packaging for sea transport consists of impregnated wood. (Observe the local regulations).
-

Motor disposition once productive life finished

Your motor has materials that can be recovered or recycled. The right separation of materials helps with an easy recycling of important materials. Leave your equipment or electrical product at a collection point. Contact your local authorities for more information on disposal of electrical equipment.

DO NOT PUT IN TRASH CONTAINERS

Technical Service 13

For questions or technical support, contact your local technical support team

https://new.abb.com/contact-centers

Visit our website to learn more about products and services.

https://new.abb.com/motors-generators

For this, have the following data available:

- **Type**
- **Serial number**

This information is described on the name plate.

Notes