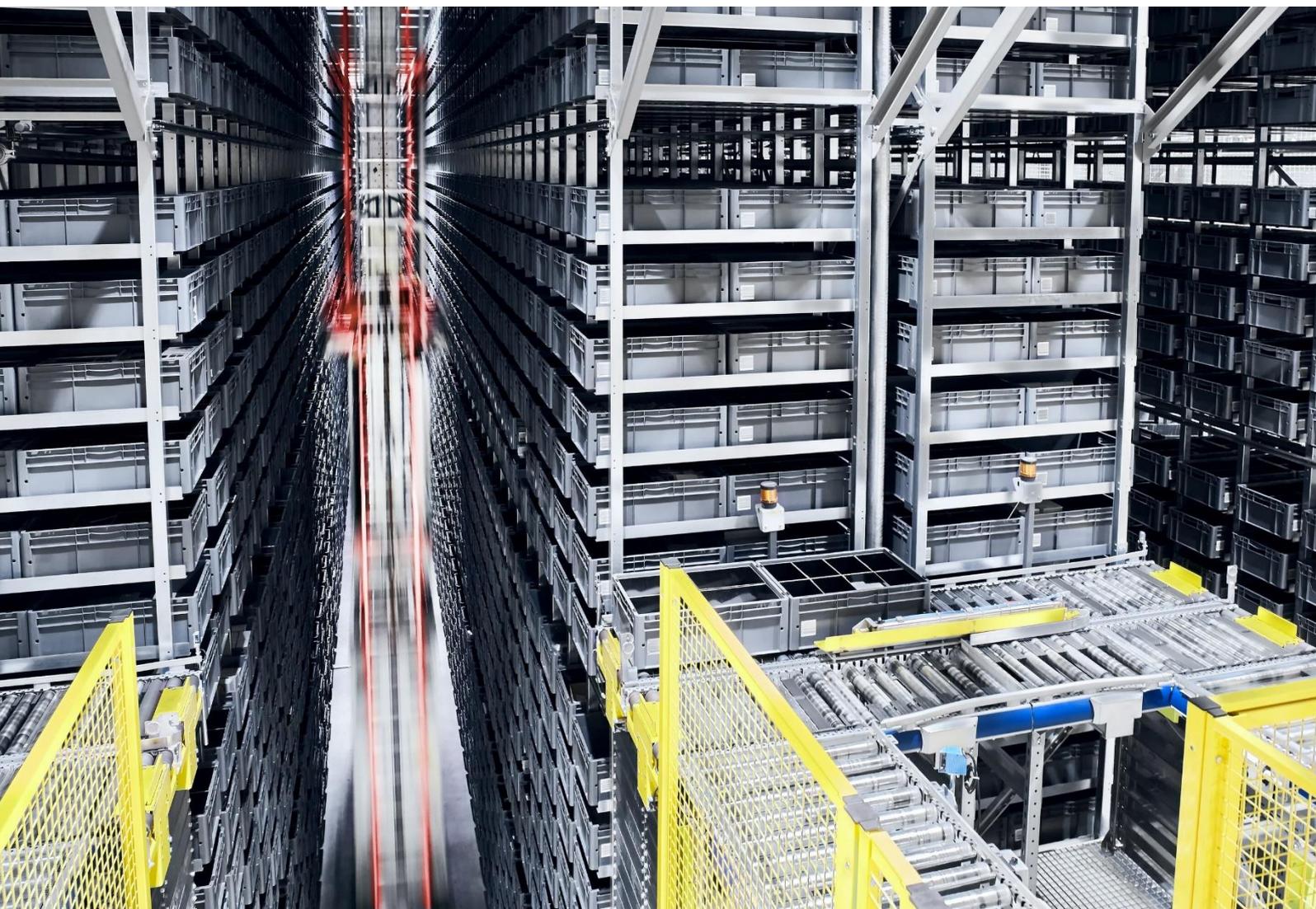


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APPLICATION NOTE

# Manual motor starters

Storage recommendation for MS1xx/MO1xx



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## **Proper storage of manual motor starters and relevant accessories**

Electromechanical equipment is usually stored for a certain period under varying climatic conditions before its installation. The proper storage environment is fundamental to ensure functional operation.

Improper storage conditions may cause failures in the switching and protection functions of the equipment.

Following the recommendations of this document reduces the risk of such failures when using manual motor starters and accessories like auxiliary/signaling contacts or electrical releases.

## Scope

We suggest to follow the recommendations described in this document to ensure proper storage of ABB's manual motor starters (MS1xx and MO1xx series) and relevant accessories like auxiliary contacts (HK1 and HKF1), signaling contacts (SK1 and CK1), shunt trips (AA1) and undervoltage releases (UA1), even if for a short time, before being put into service.

The following recommendations in this document are not exhaustive and are applicable to all ABB manual motor starters (MS1xx and MO1xx series) and relevant accessories as listed above.

On receipt of product, the customer takes full responsibility for the storage of products and adapts these recommendations to their own particular cases.

Nonetheless any clause to the contrary, ABB shall not be liable for any damages, claims or losses, etc., directly or indirectly connected to the present recommendations for storage.

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## 1. General cautions at products arrival to storage areas

- Corroborate the equipment information on the receipt
- Protect packages of equipment with a waterproof cover

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## 2. Ambient air temperature and humidity

The equipment is intended to be stored at the ambient air temperature (\*) range from -50 °C to +80 °C.

The relative humidity of the air must not exceed 50 % at a temperature of +40 °C. Higher relative humidity is permitted at lower temperatures (e.g. 90 % at +20 °C); for higher temperature, lower relative humidity is permitted (e.g. 20 % at 70 °C).

Equipment is intended to be stored inside a stable temperature environment:

- Quick or low temperature variation can create condensation inside the product and damage it.
- Sudden changes of temperature must be avoided: in case the equipment is subjected to quick changes of temperature, it is mandatory to check that there is no presence of condensation on the devices before putting into service.

*(\*) Ambient air temperature is the temperature near the device.*

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## 3. Precipitation and wind

It is important to protect the equipment from rain, hail, snow, wind or the combined effect of precipitation and wind. The equipment must be stored in a room or warehouse sheltered from the elements.

Additional protection may be considered to cover the equipment packages with a waterproof cover on the upper, lower, and lateral surfaces of the packages in regards to the storage room or warehouse environment.

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## 4. Air pressure

The upper limit for air pressure inside the storage area must not exceed 107% of the air pressure at sea level.

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## 5. Solar radiation

The equipment has to be stored in a covered room or warehouse as it is important to protect it from direct solar radiation: exposure to solar radiation causes peak temperatures that can damage plastic materials and grease.

If the air temperature is regularly close to the allowed lower temperature limit (-50 °C), it is mandatory to keep the equipment in a covered room because the radiation can further reduce the temperature in many parts, accelerating the aging phenomena.

Sudden changes of temperature must be avoided. In case equipment is subjected to fast changes of temperature; it is mandatory to verify there is no presence of condensation on the devices before putting it into service.

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## 6. Dust, sand and smoke

Dust, sand and smoke cause damages and rapid wear of products; these effects are increased by high wind speed. The presence of dust and sand is influenced by several factors like the type of terrain, wind, temperature, humidity and precipitation. The combination of these factors can also contribute to the damage of the equipment. Desert or seaside regions are more likely to experience these phenomena. Dust and sand concentration and the presence of large particles are increased with higher wind speed. It is mandatory to protect the packages of equipment with a sealed waterproof cover.

Particularly critical locations are mills, cement mills, sawmills and similar places where sedimentation arises throughout a manufacturing process. Other critical places are locations where dust storms occur or around a vehicle in motion on dusty roads. It is strictly recommended to avoid the storage in these plants or places.

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## 7. Salt mist

The atmosphere over the sea and in coastal areas is largely saline, consisting of solid particles of salt or small drops of saline solution, among other components. The constituent parts of a saline atmosphere are approximately equal to those found in the sea.

If the equipment must be stored in coastal areas, it is recommended to protect the packages of equipment with a sealed waterproof cover, to avoid corrosion.

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## 8. Chemical agents

If the equipment must be stored in environments where the atmosphere can contain aggressive chemical substances, it is recommended to protect the packages of equipment with a sealed waterproof cover.

The most aggressive chemical substances for circuit breakers are: sulphur dioxide, hydrogen sulphide, chlorine, hydrogen fluoride, ammonia, ozone and nitrogen oxides.

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## 9. Vibration and shock

Vibration and shock references are valid under the condition that the equipment is stored inside its original packages without any damages.

Maximum values allowed for stationary sinusoidal vibrations are:

- Displacement amplitude 0.3 mm for frequency range 2 Hz ... 9 Hz
- Acceleration amplitude 1 m/s<sup>2</sup> for frequency range 9 Hz ... 200 Hz

Occasionally non-stationary vibrations, including shocks, are allowed if the shock response spectrum is type I (ref. IEC 60721-3-1) and peak acceleration is less than 40 m/s<sup>2</sup>.

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## 10. Seismic phenomena

The vibration nature of the ground motion (both horizontal and vertical) can be magnified in foundation-mounted products: for any given ground motion the magnification depends on the characteristic frequencies of vibration of the system (soil, foundation and product) and on the mechanism of damping. In seismic regions, the equipment must be stored on a foundation suitable to reduce the magnitude of vibrations.

The storage area and storage support systems must not contribute to magnifying the vibrations amplitude.

- If during the storage period, the equipment is subjected to a moderate earthquake (persisting for 15 s to 30 s and Richter magnitude degree up to 3), no actions are required.
- If during the storage period, the equipment is subjected to a medium earthquake (persisting for more than 30 s or Richter magnitude degree from 4 up to 6), it is mandatory to check every functionality of the product.
- If during storage period, the equipment is subjected to a strong earthquake (persisting for more than 60 s or Richter magnitude degree higher than 6), it is strictly recommended not to put the equipment in service.

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## 11. Flora and fauna

In geographical areas with warm damp climates, fauna and flora (especially insects and micro-organisms, such as mold and bacteria) will find a favorable condition of life. Humid or wet rooms in buildings or rooms for processes producing humidity are suitable living spaces for rodents, insects and micro-organisms. If the surface of the product carries layers of organic substances (e.g. grease, oil, dust) or deposits of animal or vegetable origin, these surfaces become an ideal media for mold and bacteria formation.

It is important to avoid deposits from fauna on the packages of the equipment (especially from insects, rodents and birds) like:

- Presence of the animals themselves
- Building of nests or settlements
- Feed stocks
- Metabolic products and enzymes

It is important to avoid deposits from flora on packages of the equipment like:

- Detached parts of plants (leaves, blossom, seeds, fruits, etc.)
- Growth layers of cultures of molds or bacteria and effects of their metabolic products

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## 12. Fire exposure

In case of possible fire exposure, the equipment must be stored following these indications:

- No presence of fire sources in the room
- Absent of every kind of fuel in the room
- Absent of combusting gases in the room
- At least one meter of distance from surfaces with an external temperature over 80 °C.

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## 13. Pollution degree

The pollution degree refers to the environmental conditions for which the equipment is intended. The micro-environment determines the effects on the insulation; it includes all factors influencing the insulation, such as climatic and electromagnetic conditions, generation of pollution, etc. For equipment fitted inside an enclosure and intended for usage inside of it, the pollution degree of the environment is applicable to the enclosure.

According to IEC 60947, in general conditions or unless otherwise stated by the relevant product standards, pollution degree of industrial applications can be assumed as “Pollution degree 3” (Conductive pollution occurs, or dry, non-conductive pollution occurs which becomes conductive due to condensation).

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## 14. Mode of storage

- Keep the equipment in the original package
- Position the packages of equipment on a horizontal surface, not in direct contact with the floor, but on a suitable support surface

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## 15. Putting equipment into service

Visual inspection of the equipment looking for: dust, cleanliness, plastic cracking or corrosion on the connecting parts, can be an indication of the performance or the storage conditions.

Before putting the equipment into service, it is mandatory to follow all instructions included in the installation documentation supplied with the equipment or on ABB's webpages.

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## Bibliography

1. IEC 60947 – Low voltage switchgear and controlgear – Part 4.1: Contactors and Motorstarters- Electromechanical contactors and motorstarters
2. IEC 60721 sect. 1 - Environmental conditions appearing in nature: Temperature and humidity 1.1.1 e 1.1.3.
3. IEC 60721 sect. 2 - Environmental conditions appearing in nature: Precipitation and wind.
4. IEC 60721 sect. 3 - Environmental conditions appearing in nature: Air pressure.
5. IEC 60721 sect. 4 - Environmental conditions appearing in nature: Solar radiation and temperature.
6. IEC 60721 sect. 5 - Environmental conditions appearing in nature: Dust, sand, salt mist.
7. IEC 60721 sect. 6 - Environmental conditions appearing in nature: Earthquake vibration and shock.
8. IEC 60721 sect. 7 - Environmental conditions appearing in nature: Fauna and flora.
9. IEC 60721 sect. 8 - Environmental conditions appearing in nature: Fire exposure.
10. IEC 60721-3-1 - Classification of groups of environmental parameters and their severities –Section 1: Storage.



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