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# Safety and Commissioning Instructions for SERVAX Low Voltage Machinery

(in accordance with low voltage directive 73/23/EEC)

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## Safety

Low voltage machinery can contain live and rotating parts and possibly hot surfaces. Incorrect handling of low voltage machinery can result in serious personal injury and damage to property. All transport, connection, start-up and regular maintenance work must be carried out by qualified personnel (observe VDE 0105; IEC 364). The relevant national, local and system-specific conditions and requirements must be observed. It is essential that warning and information signs on machinery be observed. The rotors of SERVAX synchronous drives contain permanent magnets with high magnetic flux densities and strong attractive forces to ferromagnetic bodies. There is a risk to people with pacemakers in the vicinity of a synchronous rotor. Data saved on electronic data carriers can be destroyed.

## Correct Usage

SERVAX drives are designed for industrial or commercial systems. They meet the harmonised standards of EN60034 (VDE 0530). Their use in potentially explosive areas is prohibited unless they are specifically designed for this environment (observe additional instructions). The drives are designed for ambient temperatures of -15 °C to +40 °C and installation heights of up to 1000 m above sea level. Alternative specifications that appear on the name plate must be observed. The conditions in the installation location must meet all the specifications on the name plate. SERVAX drives are components designed for installation in machinery in accordance with the machinery directive 89/392/EEC. Start-up may only be performed if it is ensured that the end product conforms with this directive (observe EN 60204-1, etc.). The EMC directive 89/336/EEC must be met.

## Transport and Storage

Only the openings, lifting eyes, etc. provided may be used for transport. Note the weight of the drive when selecting lifting equipment. Refer to the data sheet for the weight. No additional weights may be applied. Before start-up, remove any transportation securing devices that may be present. A dry, dust-free and low-vibration ( $v_{rms} < 0.2$  mm/s) environment must be used for storage (damage to bearings in the stop state). Measure the insulation resistance prior to start-up.

## Set-Up

Ensure installation on an even surface, good foot/flange mounting and exact alignment. The drive elements (belt pulley, coupling, etc.) must only be connected/disconnected using suitable components/procedures (thermal assembly, e.g. by heating) and equipped with shock protection. Prevent impermissible strain at the shaft end. The system installation engineer is responsible for carrying out correct installation.

## Electrical Connection

All connection work for SERVAX drives may only be carried out by qualified personnel on the machine in the stop state and it must be ensured that the machine cannot be activated or reset. This also applies for auxiliary circuits (e.g. heating in the stop state, brakes, encoders). Check safe isolation from the power supply.

**CAUTION:** The motors must be operated on the inverters supplied. Connection to the three-phase mains is only permitted if the drive is designed for this (see data sheet). Observe the specifications on the name plate as well as the block diagram in the terminal box or in the operating instructions. Check the compatibility of encoder and sensor signals with the evaluation equipment. Encoders and sensors usually contain electrostatic sensitive devices (ESD); observe ESD safety measures if necessary. Only remove, install and adjust encoders in accordance with the corresponding instructions. Connections must be made in such a way that a permanent safe electrical connection is maintained (no protruding wire ends); use corresponding cable lugs or ferrules. Establish a safe protective conductor connection.

Tightening torque for terminal board connections:

Thread	M4	M5	M6	M8	M10
Tightening torque/Nm	0.8 ... 1.2	1.8 ... 2	2.7 ... 4	5.5 ... 8	9 ... 13

For the terminal box connection, observe a minimum air gap of 5.5 mm for uninsulated live parts. Terminal boxes and connectors must not contain foreign bodies, dirt or moisture. Ensure unused cable openings and the terminal box itself are sealed to be dustproof and waterproof. Observe the corresponding instructions and information when connecting and installing accessories (e.g. tachometer generators, impulse encoders, brakes, temperature sensors, airflow monitors, etc.), contact SERVAX if necessary. For drives with brakes, check the brakes are operating correctly prior to start-up.

## Operation

A feather key must be connected for trial operation without drive elements. The direction of rotation of the machine must be checked when disconnected. Vibrations of  $v_{rms} < 3.5$  mm/s are usually harmless when connected. Overheating of the drives can damage the windings and bearings as well as demagnetise the magnets of PM synchronous motors. The motors must only be operated with effective temperature control. In the event of deviations from normal operation (e.g. increased temperatures, noise, vibrations) switch off the drive. Determine the cause (contact SERVAX if necessary). In the event of a large build-up of dirt, especially in air-cooled drives, clean air ways regularly. For water-cooled machines, use frost and corrosion protection as well as additives to prevent the build-up of algae. Unless otherwise agreed, worn parts (bearings, seals) should be replaced by SERVAX as necessary, or after a maximum of three years. The drives must not be dismantled by unauthorised personnel, as product-specific knowledge is required.