

P8000 Series Stepper Drive

Safety Notes

This document presents the safety information for P8000 series of stepper drives.

P8000



For complete information refer to the user documents for the P8000 Stepper series of drives. Download the P8000 Installation Manuals and all Kollmorgen user documents at:

www.kollmorgen.com/en-us/products/drives/stepper/p8000

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For safe and proper use, follow these instructions. Keep for future use.

Front Matter

Documents available from: www.kollmorgen.com

- **Installation Manual** for each model in the P8000 series (PDF format):
These manuals provide instructions for installation and drive setup.

Disclaimer

Technical changes which improve the performance of the device may be made without prior notice!

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1 Introduction

These Safety Notes do not contain complete documentation for the P8000 Series stepper drives. See the Installation Manual for full product and safety information. Installation Manuals for the P8000 can be found on the P8000 Stepper Drive page of the Kollmorgen website under [Media and Downloads](#).

2 Safety Guidelines

This section helps to recognize risks and avoid dangers to people and objects.

Specialist staff required!

The devices are intended for industrial applications. Machine builders must employ qualified personnel. Qualified personnel are people who have been trained to transport, install, commission and operate electrical drives.

- Transport, storage, unpacking: only by personnel with knowledge of handling electrostatically sensitive components.
- Mechanical installation: only by personnel with mechanical expertise.
- Electrical installation: only by personnel with expertise in electrical engineering.
- Basic tests / setup: only by personnel with expertise in electrical engineering and drive technology.

The qualified personnel must know and observe ISO 12100 / IEC 60364 / IEC 60664 and national accident prevention regulations.

Read the documentation!

Read the available documentation before installation and commissioning. Improper handling of the devices can cause harm to people or damage to property. The operator of systems using the drive system must ensure that all personnel who work with the drive read and understand the manual before using the drive.

Pay attention to the technical data!

Adhere to the technical data and the specifications on connection conditions. If permissible voltage values or current values are exceeded, the devices can be damaged. Unsuitable motor or wrong wiring will damage the system components. Check the combination of drive and motor. Compare the rated voltage and current of the units.

Perform a risk assessment!

The manufacturer of the machine must generate a risk assessment for the machine, and take appropriate measures to ensure that unforeseen movements cannot cause injury or damage to any person or property. Additional requirements on specialist staff may also result from the risk assessment.

WARNING

- The circuits in the P8000 drive are a potential source of severe electrical shock. Follow the safety guidelines to avoid shock.
- Miswiring of the P8000 drive may result in damage to the unit and void the warranty. Improper grounding of the drive may cause serious injury to the operator.



It is the machine builder's responsibility to ensure that the complete machine complies with the Machine Directive (EN60204). The following requirements relate directly to the stepper controller:

- Do not operate the drive without the motor case tied to earth ground. Keep all covers and cabinet doors shut during operation.
- Do not make any connections to the internal circuitry. The input and output signals are the only safe connection points.
- Never plug or unplug connectors with power applied. During operation, the product has electrically charged components and hot surfaces. Control and power cables can carry a high voltage, even when the motor is not rotating.
- Never disconnect or connect the product while the power source is energized.
- Be careful of the motor terminals when disconnected from the motor. With the motor disconnected and power applied to the drive, these terminals have high voltage present, even with the motor disconnected.
- After removing the power source from the equipment, wait at least 3 minutes before touching or disconnecting sections of the equipment that normally carry electrical charges (e.g., capacitors, contacts, screw connections). To be safe, measure the electrical contact points with a meter before touching the equipment.
- Do not use the Enable Input as a safety shutdown. Always remove power to the drive for a safety shutdown.
- If the drive indicates a fault condition, find the cause of the fault and fix it prior to resetting the fault or power cycling the drive.
- Wait until the green LED light is switched off before manipulating or executing maintenance to the drive
- Pay attention to the temperature of the drive. Using the drive in extreme applications can result in some surfaces reaching high temperatures. Before disconnecting the drive, wait until it has cooled down.

Observe electrostatically sensitive components!

The devices contain electrostatically sensitive components which may be damaged by incorrect handling. Electrostatically discharge your body before touching the device. Avoid contact with highly insulating materials (artificial fabrics, plastic film etc.). Place the device on a conductive surface.

Hot surface!



Drives may have hot surfaces during operation. The housing can reach temperatures above 75° C. Risk of minor burns! Measure the temperature, and wait until the housing has cooled down below 40 °C before touching it.

Functional Safety!

The STO safety implementation on the P80360 is qualified. The assessment of the safety functions according to EN ISO 13849-1 must finally be done by the user.

Never modify the drive!

It is not allowed to modify the drive hardware without permission by the manufacturer. Opening the housing causes loss of warranty.

2.1 Use As Directed

The P8000 drives are exclusively intended for driving suitable 2-phase hybrid steppers with the option of closed-loop position control on the P80360 model.

Drives are components that are built into electrical plants or machines and can only be operated as integral components of these plants or machines. The manufacturer of the machine must generate a risk assessment for the machine.

When the drives are built into machines or plant, the drive must not be used until it has been established that the machine or plant fulfills the requirements of the regional directives.

Cabinet and wiring

Drives must only be operated in a closed control cabinet suitable for the ambient conditions. Ventilation or cooling may be necessary to keep the temperature within the cabinet below the drive's maximum working temperature rating, which may be either 40 °C or 50 °C.

Only use copper conductors for wiring. The conductor cross-sections can be derived from the standard IEC 60204 (alternatively for AWG cross-sections: NFPA Table 310-16, 75 °C column or standard UL 61800-5-1 section 6.3.6.4.DV.2).

Power supply

The P80360 drives can be supplied by 1-phase industrial supply networks (100-240V).

The P80630 power supply system design must ensure inrush current protection by limiting input current during power up. DC supply polarity must be properly wired. Improper polarity of DC power will damage the drive and void warranty.

Motor voltage rating

The rated voltage of the motors must be at least as high as the DC bus link voltage divided by $\sqrt{2}$ produced by the drive ($U_{nMotor} \geq U_{DC} / \sqrt{2}$).

Safe torque off

Review the section Safe Torque Off (STO) Inputs (Mandatory) in the P80360 Installation Manual before using this safety function. (According to ISO 13849 category 3).

Installation Manuals for the P8000 can be found on the P8000 Stepper Drive page of the Kollmorgen website under [Media and Downloads](#).

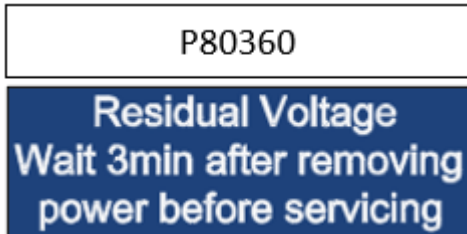
2.2 Prohibited Use

Usage other than that described in "Use As Directed" is not intended and can lead to personnel injuries and equipment damage. The drive may not be used with a machine that does not comply with appropriate national directives or standards. The use of the drive in the following environments is also prohibited:

- potentially explosive areas
- environments with corrosive and/or electrically conductive acids, alkaline solutions, oils, vapors, dusts
- ships or offshore applications

2.3 Warning Note Labels

Notes placed on the product



NOTE

If a warning note label is damaged or accidentally removed, it must be replaced immediately.

2.4 Product Lifecycle Handling

Transport

- Transport only by qualified personnel in the manufacturer's original recyclable packaging. Avoid shocks while transporting.
- Transport only within the specified ambient temperature ranges: -25 °C to 55 °C
- Transport only within the specified humidity: 5% to 85% relative humidity, non-condensing

Inspect the unit for any physical damage that may have been sustained during shipment. If damage is detected, either concealed or obvious, notify the carrier immediately.

Storage

Store the P8000 drive in accordance with IEC 61800-2 as follows:

- Store only in the manufacturer's original recyclable packaging.
- Store only within specified temperature ranges: -25 to +55 °C, max.rate of change 20/hour, class 1K4.
- Store only within specified humidity: 5% to 85% relative humidity, non-condensing.

Installation, setup and normal operation

Installation and setup information is provided in the drive's Installation Manual.

Decommissioning

NOTICE

Only professional staff who are qualified in electrical engineering are allowed to decommission parts of the system.

DANGER

Lethal Voltages!

There is a danger of serious personal injury or death by electrical shock or electrical arcing.

- Switch off the main switch of the switchgear cabinet.
- Secure the system against restarting.
- Block the main switch.
- Wait at least 3 minutes after disconnecting.

Maintenance and cleaning

The device does not require maintenance, it should be inspected once a year by professional staff.

NOTICE

Do not immerse or spray the device. Avoid liquid entering the device. The inside of the unit can only be cleaned by the manufacturer. Opening the device voids the warranty.

To clean the device exterior:

1. Decommission the device (see [Decommissioning](#)).
2. Casing: Clean with Isopropanol or similar cleaning solution.

Caution : Highly Flammable! Risk of injury by explosion and fire.

- Observe the safety notes given on the cleaning liquid package.
- Wait at least 30 minutes after cleaning before putting the device back into operation.

Disassembly

NOTICE

Only professional staff who are qualified in electrical engineering are allowed to disassemble parts of the system.

1. Decommission the device (see [Decommissioning](#)).
2. Check temperature.

CAUTION: High Temperature! Risk of minor burns. During operation, the heat sink of the drive may reach temperatures above 75 °C (167 °F). Before touching the device, check the temperature and wait until it has cooled below 40 °C (104 °F).

3. Remove the connectors. Disconnect the potential earth connection last.
4. Demount: Loosen the fastening screws. Remove the device.

2.4.1 System Repair

NOTICE

Only professional staff who are qualified in electrical engineering are allowed to exchange parts of the drive system.

CAUTION: Automatic Start! During replacement work, a combination of hazards and multiple episodes may occur.

- Work on the electrical installation may only be performed by trained and qualified personnel, in compliance with the regulations for safety at work, and only with use of prescribed personal safety equipment.

2.4.1.1 Exchange of Device

Only the manufacturer can repair the device. Opening the device voids the warranty.

1. Decommission the device (see [Decommissioning](#)).
2. Demount the device (see [Disassembly](#)).
3. Send the device to the manufacturer.
4. Install a new device as described in the Installation Manual.
5. Setup the system as described in the Installation Manual.

2.4.1.2 Exchange of Drive System Parts

If parts of the drive system (for example cables) must be replaced, proceed as follows:

1. Decommission the device (see [Decommissioning](#)).
2. Exchange the parts.
3. Check all connections for correct fastening.
4. Setup the system as described in the Installation Manual.
















2.4.1.3 Disposal

NOTICE








To dispose the unit properly, contact a certified electronic scrap disposal merchant.

3 Working Status (LED)

P80360 LED Status Table

Visualization Status			Description
1		Green ON	Driver enabled (Properly functioning)
2		Green Blinking	Driver disabled (Enable Off, Current zero)
3		Blue ON	Error: Connect with Service SCI Interface kit and check with Kollmorgen Space Drive Diagnostic window.
4		Blue ON + Yellow ON	Drive in boot mode. A new firmware should be downloaded to the drive.
5		Blue ON + Red Blinking (200ms)	Initialization phase. Should last for a few seconds. Drive is not fully operational while present.
6		Yellow ON	Missing I_nominal current setting
7		Yellow Blinking (500ms)	Warning: Connect with Service SCI Interface kit and check with Kollmorgen Space.
8		Red ON	Protection: Motor is in open phase condition.
9		Red Blinking (200ms)	Protection: Motor phase shortcut (short circuit).
10		Red ON (1s) + Yellow 1 Blink	Protection: Overvoltage.
11		Red ON (1s) + Yellow 3 Blink	Protection: Undervoltage.
12		Red ON (1s) + Yellow 4 Blink	Thermal Protection: Overtemperature
13		Red ON (1s) + Yellow 5 Blink	Motor Feedback Error
14		Red ON (1s) + Yellow 6 Blink	Missing Torque Enable (24 V _{DC} STO not powered before AC supply).
15		Red ON (1s) + Yellow 7 Blink	Motor Current Regulation is out of range.

P80630 LED Status Table

Visualization Status			Description
1		Green ON	Driver enabled
2		Green Blinking (1sec)	Driver disabled
3		Red ON	Protection: Motor is in open phase condition
4		Red Blinking (200ms)	Protection: Motor phase shortcut (short circuit)
5		Red ON (2sec) + Yellow (1sec) Blink	Protection: Over voltage
6		Red ON (2sec) + Yellow (1sec) Blink + Yellow (1sec) Blink	Protection: Under voltage
7		Red ON (2sec) + Yellow (1sec) Blink + Yellow (1sec) Blink + Yellow (1sec) Blink	Thermal Protection: Over temperature
8		Yellow Blinking (200ms)	Motor stalled

When any of the following situations occur, the drive is placed in a fault condition.

Defect	Cause	Action
Intervention of the thermal protection (heatsink > 75 °C)	Can be caused by a prolonged duty cycle, high current in the motor or high voltage paired with a low inductance motor	It is necessary to wait until the temperature is within the acceptable range. Next, improve the drive cooling by a natural or fan air flow. Consider using a motor with a higher torque vs current rating.
Intervention of the current protection	Short circuit on the motor power stage of the drive, excessive current absorption or power supply current too low.	Remove the power to the drive to eliminate the cause of the protection. Next, check motor windings and cables to remove the short circuits replacing faulty cables or motor if necessary. Can also occur due to power supply current being too low.
Intervention of the over/under voltage protection	Supply voltage out of range. Too high, too low, or extra voltage due to Back EMF generated by the motor	It is necessary to wait until the voltage is within the acceptable range. Check the value for the supply voltage and verify it is within the input voltage limit for the drive.
Open phase motor protection	Motor windings to the drive are not connected properly	Remove the power to the drive to eliminate the cause of the protection. Next, check motor cables and connections to the drive.

NOTE

The drive could be considered in a correct status if LEDs don't show Red, Yellow, or Blue.

In general:

- Red LED: an alarm or a drive protection
- Yellow LED: a warning
- Blue LED: a software internal fault or a non-operative condition

NOTE

The fault condition will remain until the drive is reset by the following method:

- Power Cycle
- Alarm Reset within Kollmorgen Space Drive Diagnostic window

⚠ CAUTION

P80630 models: Remember to avoid ON/OFF switching of any DC connection to the drive.

Hard-wire the drive to the power supply and switch the power supply AC input ON/OFF instead. Switching the DC to the drive results in very high inrush currents. This could potentially damage the P8000 drive or the ON/OFF switch.

Support and Services

About KOLLMORGEN

Kollmorgen is a leading provider of motion systems and components for machine builders. Through world-class knowledge in motion, industry-leading quality and deep expertise in linking and integrating standard and custom products, Kollmorgen delivers breakthrough solutions that are unmatched in performance, reliability and ease-of-use, giving machine builders an irrefutable marketplace advantage.



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