



SV660F Series Servo Drive Maintenance Guide



Industrial
Automation



Intelligent
Elevator



New Energy
Vehicle



Industrial
Robot



Rail
Transit



Data code 19012105A03

Preface

Introduction

The SV660F series servo drive is a high-performance AC servo product developed by Inovance for small and medium power applications. With a power range from 0.05 kW to 7.5 kW, it supports PROFINET communication protocol and carries Ethernet communication interfaces to work with the host controller for a networked operation of multiple servo drives.

This series also supports stiffness level setting, inertia auto-tuning, and vibration suppression to simplify the operation process. It can be used with the MS1 series high-response servo motor (with low or medium inertia) equipped with a 23-bit multi-turn absolute encoder to enable quiet and stable operation.

It is suitable for lithium battery PACK, printing and packaging, logistics, automobile manufacturing, tobacco, and other industries to achieve fast and accurate collaborative control.

This guide describes the routine maintenance, repair, and component replacement of the product.

More data

Name	Code	Description
SV660F Series Servo Drive Selection Guide	19011667	Introduces product selection, including supporting components, technical data on drive and motor, and cable selection.
SV660F Series Servo Drive Hardware Guide	19011666	Introduces electrical design guidance, terminal description, required certificates and standards, and solutions to common EMC problems.
SV660F Series Servo Drive Commissioning Guide	19011668	Introduces parameters and servo commissioning, including the operating panel, commissioning software, and commissioning procedure.
SV660F Series Servo Drive Communication Guide	19011670	Introduces functions and parameters of the product, including PROFINET communication configuration, parameter description, and communication application cases.
SV660F Series Servo Drive Function Guide	19011669	Introduces the functions and parameters of the product, including function overview, basic servo functions, adjustment instructions, and parameter description.

Name	Code	Description
SV660F Series Servo Drive Installation Guide	19012103	Introduces the installation of the product, including installation procedure, mechanical installation, and electrical installation.
SV660F Series Servo Drive Troubleshooting Guide	19012104	Introduces fault levels, fault codes, warning codes, and troubleshooting of the product.
SV660F Series Servo Drive Safety Guide	19012110	Introduces the safety function and related certifications and standards, wiring, commissioning, troubleshooting, and functions.
SV660F Series Servo Drive Manual Package	PS00005951	Introduces the model selection, installation, wiring, commissioning, functions, troubleshooting, and parameters of the product.

Revision History

Date	Version	Revision
November 2024	A03	Made minor corrections.
August 2024	A02	Made minor corrections. Updated the fundamental safety instructions.
March 2024	A01	Updated the address of Suzhou Inovance Technology Co., Ltd.
July 2022	A00	Initial release

Access to the Guide

This guide is not delivered with the product. You can obtain the PDF version in the following ways

- Do keyword searching under Service and Support at <http://www.inovance.com>.
- Scan the QR code on the equipment to acquire more.
- Scan the QR code below to install My Inovance app, where you can search for and download user guides.



Warranty Disclaimer

Inovance provides warranty service within the warranty period (as specified in your order) for any fault or damage that is not caused by improper operation of the user. Maintenance will be charged after the warranty period expires.

Within the warranty period, maintenance fee will be charged for the following damage:

- Damage caused by operations not following the instructions in the user guide

- Damage caused by fire, flood, or unusual voltage
- Damage caused by unintended use of the product
- Damage caused by use beyond the specified scope of application of the product
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

The maintenance is charged according to the latest Price List of Inovance. If otherwise agreed upon, the terms and conditions in the agreement shall prevail.

For details, see the Product Warranty Card.

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Safety Instructions

Disclaimer

- This chapter presents essential safety instructions for a proper use of the equipment. Before operating the equipment, read through the guide and comprehend all the safety instructions. Failure to comply with the safety precautions may result in death, serious injury, or equipment damage.
- "CAUTION", "WARNING", and "DANGER" items in the guide only indicate some of the precautions that need to be followed; they just supplement the safety precautions.
- Use this equipment according to the designated environment requirements. Damage caused by improper use is not covered by warranty.
- Inovance shall take no responsibility for any personal injuries or property damage caused by improper use.

Safety Levels and Definitions



Indicates that failure to comply with the notice will result in death or severe personal injuries.



Indicates that failure to comply with the notice may result in death or severe personal injuries.



Indicates that failure to comply with the notice may result in minor or moderate personal injuries or equipment damage.

Safety Instructions

- Drawings in the guide are sometimes shown without covers or protective guards. Remember to install the covers or protective guards as specified first, and then perform operations in accordance with the instructions.
- The drawings in the guide are shown for illustration only and may be different from the product you purchased.
- Users must take mechanical precautions to protect personal safety and wear protective equipment, such as anti-smashing shoes, safety clothing, safety glasses, protective gloves, and protective sleeves.

Unpacking



- Do not install the equipment if you find damage, rust, or signs of use on the equipment or accessories upon unpacking.
- Do not install the equipment if you find water seepage or missing or damaged components upon unpacking.
- Do not install the equipment if you find the packing list does not conform to the equipment you received.



- Check whether the package is intact and whether there is damage, water seepage, dampness, and deformation before unpacking.
- Unpack the package by following the unpacking sequence. Do not strike the package violently.
- Check whether there is damage, rust, or injuries on the surface of the equipment and equipment accessories before unpacking.
- Check whether the package contents are consistent with the packing list before unpacking.

Storage and Transportation



- Large-scale or heavy equipment must be transported by qualified professionals using specialized hoisting equipment. Failure to comply may result in personal injuries or equipment damage.
- Before hoisting the equipment, ensure the equipment components such as the front cover and terminal blocks are secured firmly with screws. Loosely-connected components may fall off and result in personal injuries or equipment damage.
- Never stand or stay below the equipment when the equipment is being hoisted by the hoisting equipment.
- When hoisting the equipment with a steel rope, ensure the equipment is hoisted at a constant speed without suffering from vibration or shock. Do not turn the equipment over or let the equipment stay hanging in the air. Failure to comply may result in personal injuries or equipment damage.

 CAUTION

- Handle the equipment with care during transportation and mind your steps to prevent personal injuries or equipment damage.
- When carrying the equipment with bare hands, hold the equipment casing firmly with care to prevent parts from falling. Failure to comply may result in personal injuries.
- Store and transport the equipment based on the storage and transportation requirements. Failure to comply will result in equipment damage.
- Avoid storing or transporting the equipment in environments with water splash, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
- Avoid storing this product for more than three months. Long-term storage requires stricter protection and necessary inspections.
- Pack the equipment strictly before transportation. Use a sealed box for long-distance transportation.
- Never transport the equipment with other equipment or materials that may harm or have negative impacts on this equipment.

Installation

 DANGER

- The equipment must be operated only by professionals with electrical knowledge. Non-professionals are not allowed.

 WARNING

- Read through the guide and safety instructions before installation.
- Do not install this equipment in places with strong electric or magnetic fields.
- Before installation, check that the mechanical strength of the installation site can bear the weight of the equipment. Failure to comply will result in mechanical hazards.
- Do not wear loose clothes or accessories during installation. Failure to comply may result in an electric shock.
- When installing the equipment in a closed environment (such as a cabinet or casing), use a cooling device (such as a fan or air conditioner) to cool the environment down to the required temperature. Failure to comply may result in equipment over-temperature or a fire.
- Do not retrofit the equipment.
- Do not fiddle with the bolts used to fix equipment components or the bolts marked in red.
- When this product is installed in a cabinet or terminal equipment, protection measures such as a fireproof enclosure, electrical enclosure, or mechanical enclosure must be provided. The IP rating must meet IEC standards and local laws and regulations.
- Before installing equipments with strong electromagnetic interference, such as a transformer, install a shielding equipment for the equipment to prevent malfunction.
- Install the equipment onto an incombustible object such as a metal. Keep the equipment away from combustible objects. Failure to comply will result in a fire.



CAUTION

- Cover the top of the equipment with a piece of cloth or paper during installation. This is to prevent unwanted objects such as metal chippings, oil, and water from falling into the equipment and causing faults. After installation, remove the cloth or paper on the top of the equipment to prevent over-temperature caused by poor ventilation due to blocked ventilation holes.
- Resonance may occur when the equipment operating at a constant speed executes variable speed operations. In this case, install the vibration-proof rubber under the motor frame or use the vibration suppression function to reduce resonance.

Wiring



DANGER

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Before wiring, cut off all the power supplies of the equipment. and wait for at least the time designated on the equipment warning label before further operations because residual voltage still exists after power-off. After waiting for the designated time, measure the DC voltage in the main circuit to ensure the DC voltage is within the safe voltage range. Failure to comply will result in an electric shock.
- Do not perform wiring, remove the equipment cover, or touch the circuit board with power ON. Failure to comply will result in an electric shock.
- Check that the equipment is grounded properly. Failure to comply can result in electric shock.



WARNING

- Do not connect the input power supply to the output end of the equipment. Failure to comply can result in equipment damage or even a fire.
- When connecting a drive to the motor, check that the phase sequences of the drive and motor terminals are consistent to prevent reverse motor rotation.
- Cables used for wiring must meet cross sectional area and shielding requirements. The shield of the cable must be reliably grounded at one end.
- Fix the terminal screws with the tightening torque specified in the user guide. Improper tightening torque may overheat or damage the connecting part, resulting in a fire.
- After wiring is done, check that all cables are connected properly and no screws, washers or exposed cables are left inside the equipment. Failure to comply may result in an electric shock or equipment damage.



CAUTION

- Follow the proper electrostatic discharge (ESD) procedure and wear an anti-static wrist strap to perform wiring. Failure to comply may result in damage to the equipment or to the internal circuit of the product.
- Use shielded twisted pairs for the control circuit. Connect the shield to the grounding terminal of the equipment for grounding purpose. Failure to comply will result in equipment malfunction.

Power-on

 DANGER

- Before power-on, check that the equipment is installed properly with reliable wiring and the motor can be restarted.
- Check that the power supply meets equipment requirements before power-on to prevent equipment damage or a fire.
- After power-on, do not open the cabinet door or protective cover of the equipment, touch any terminal, or disassemble any unit or component of the equipment. Failure to comply will result in an electric shock.

 WARNING

- Perform a trial run after wiring and parameter setting to ensure the equipment operates safely. Failure to comply may result in personal injuries or equipment damage.
- Before power-on, check that the rated voltage of the equipment is consistent with that of the power supply. Failure to comply may result in a fire.
- Before power-on, check that no one is near the equipment, motor, or machine. Failure to comply may result in death or personal injuries.

Operation

 DANGER

- The equipment must be operated only by professionals. Failure to comply will result in death or personal injuries.
- Do not touch any connecting terminals or disassemble any unit or component of the equipment during operation. Failure to comply will result in an electric shock.

 WARNING

- Do not touch the equipment casing, fan, or resistor with bare hands to feel the temperature. Failure to comply may result in personal injuries.
- Prevent metal or other objects from falling into the equipment during operation. Failure to comply may result in a fire or equipment damage.

Maintenance

 DANGER

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Do not maintain the equipment with power ON. Failure to comply will result in an electric shock.
- Before maintenance, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.
- In case of a permanent magnet motor, do not touch the motor terminals immediately after power-off because the motor terminals will generate induced voltage during rotation even after the equipment power supply is off. Failure to comply will result in an electric shock.

 WARNING • Perform routine and periodic inspection and maintenance on the equipment according to maintenance requirements and keep a maintenance record.
Repair
 DANGER • Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals. • Do not repair the equipment with power ON. Failure to comply will result in an electric shock. • Before inspection and repair, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.
 WARNING • Submit the repair request according to the warranty agreement. • When the fuse is blown or the circuit breaker or earth leakage current breaker (ELCB) trips, wait for at least the time designated on the equipment warning label before power-on or further operations. Failure to comply may result in death, personal injuries or equipment damage. • When the equipment is faulty or damaged, the troubleshooting and repair work must be performed by professionals that follow the repair instructions, with repair records kept properly. • Replace quick-wear parts of the equipment according to the replacement instructions. • Do not use damaged equipment. Failure to comply may result in death, personal injuries, or severe equipment damage. • After the equipment is replaced, check the wiring and set parameters again.
Disposal
 WARNING • Dispose of retired equipment in accordance with local regulations and standards. Failure to comply may result in property damage, personal injuries, or even death. • Recycle retired equipment by observing industry waste disposal standards to avoid environmental pollution.

Additional Precautions

Cautions for the dynamic brake

- Dynamic braking can only be used for emergency stop in case of failure and sudden power failure. Do not trigger failure or power failure frequently.
- Ensure that the dynamic braking function has an operation interval of more than 5 minutes at high speed, otherwise the internal dynamic braking circuit may be damaged.
- Dynamic braking is common in rotating mechanical structures. For example, when a motor has stopped running, it keeps rotating due to the inertia of its load. In this case,

this motor is in the regenerative state and short-circuit current passes through the dynamic brake. If this situation continues, the drive, and even the motor, may be burned.

Cautions for Motor Grounding

For applications such as welding machines, connect the PE cable of the motor to the screws of the cast component of the drive. Failure to comply may result in damage to the motor.

Effect of the electromagnetic field on implants

The motor may harm a nearby person who wears a medical implant.

The electromagnetic field may cause malfunction of the medical Implant (such as the heartbeat starter) being used.

Safety label

For safe equipment operation and maintenance, comply with the safety labels on the equipment. Do not damage or remove the safety labels. The following table describes the meaning of the safety labels.

Safety label	Description
	• Never fail to connect the protective earth (PE) terminal. Read through the guide and follow the safety instructions before use. • Never fail to connect Protective Earth (PE) terminal. Read the manual and follow the safety instructions before use. • Do not touch terminals within 15 minutes after disconnecting the power supply to prevent the risk of electric shock. • Do not touch terminals with 15 minutes after Disconnect the power. Risk of electrical shock. • Do not touch the heatsink with power ON to prevent the risk of burn. • Do not touch heatsink when power is ON. Risk of burn.

1 Maintenance

1.1 Routine Maintenance Items

Standard operating conditions:

The standard environmental conditions are as follows: Average ambient temperature: 30°C

Average load rate: Below 80% Daily operating time: Below 20 hours

1.1.1 Routine Checklist

Check the following items during routine inspection.

Table 1-1 Routine checklist

No.	Item	Checked
1	The ambient temperature and humidity are normal. There is no dust or unwanted objects in the servo drive.	☐
2	There is no abnormal vibration or noise.	☐
3	The voltage of the power supply is normal.	☐
4	There is no strange smell.	☐
5	There are no fibers adhered to the air vent.	☐
6	There is no intrusion of unwanted objects on the load end.	☐

1.1.2 Routine Cleaning List

Clear the following items listed in the table.

Table 1-2 Routine cleaning list

No.	Routine cleaning list	Checked
1	Clean the dust, especially the metallic dust on the surface of the equipment.	☐
2	Keep the front end of the servo drive and the connectors clean.	☐

Note

- Before cleaning, switch off the power supply and clean with an air gun or a piece of dry cloth.
 - Do not use gasoline, dilutes, alcohol, or acid or alkaline detergent to prevent enclosure discolor or damage.
-

1.2 Periodic Maintenance

1.2.1 Regular Checklist

Table 1–3 Regular checklist

No.	Item	Checked
1	The screws used to fix the couplings between devices are in place.	☐
2	There is no sign of overtemperature.	☐
3	Terminal blocks are in good condition without any sign of damage.	☐
4	The clamping units of terminal blocks are in place.	☐

1.2.2 Periodic Maintenance

The electrical and electronic parts inside the servo drive may be mechanically worn out and degraded. To keep the servo drive and servo motor in good condition, perform parts replacement based on the replacement cycles listed in the following table. Contact Inovance or your Inovance agent to check whether the parts need to be replaced.

Object	Type	Standard Replacement Interval	Remarks
Drive	Bus filter capacitor	About 8 years	The standard replacement interval is for reference only. If any device/ component works improperly before the replacement interval expires, replace it immediately.
	Fan	5 years (ambient temperature: 30°C; load rate: 80%; uptime per day: 20 hours; standard environment)	
	Control circuit aluminum electrolytic capacitor	About 5 years	
	Pre-charge relay	100000 operations (depending on the operating conditions)	
	Pre-charge resistor	20000 operations (depending on the operating conditions)	
	Dynamic brake relay	About 1000 times (rated motor speed; interval: 5 min; inertia: 20 times)	
	Dynamic brake resistor		
Motor	Bearing	3 to 5 years (20,000 h to 30,000 h)	
	Oil seal	5000 h	
	Encoder	3 to 5 years (20,000 h to 30,000 h)	
	Absolute encoder battery	Depends on the operating condition See the operation instructions for the encoder battery for details.	

2 Component Replacement

2.1 Replacing the Motor Flat Key



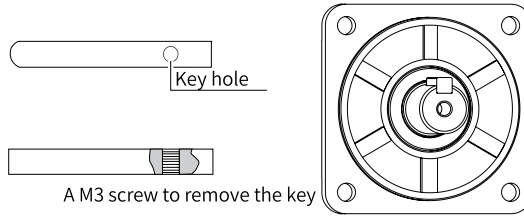
Caution

- Observe all the requirements presented in this chapter. Failure to comply may result in equipment fault or damage.
- Violent disassembly is not allowed. Take enough care during disassembly to prevent personal injury.

The MS1 series standard motors in frame sizes 60, 80, and 130 adopt C-type flat keys with disassembly holes. To disassemble the flat key, select a proper disassembly bolt (inner hexagon bolt recommended) based on the following table.

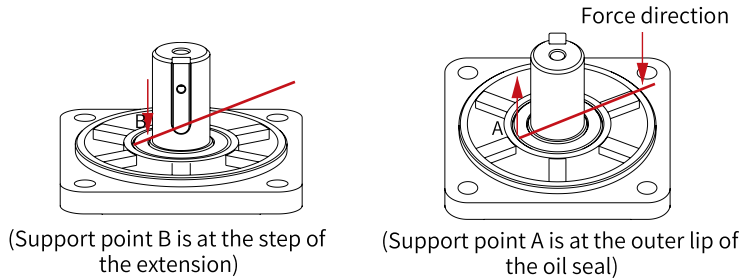
Specification of disassembly bolt for MS1 series motor		
Motor Frame Size	Flat Key Dimensions	Disassembly Bolt Specifications (Inner Hexagon Bolt)
40	A-type flat key: $A3 \times 3 \times 14$	No disassembly hole
60	C-type flat key: $C5 \times 5 \times 16.5$	M3 x 10 and above
80	C-type flat key: $C6 \times 6 \times 25$	M3 x 15 and above
100	C-type flat key: $C8 \times 7 \times 35$	M3 x 20 and above
130	C-type flat key: $C8 \times 7 \times 35$	M3 x 20 and above
180	C-type flat key: $C10 \times 8 \times 64$	M3 x 20 and above

- Tool needed: an Allen wrench
- Disassembly procedure:
 1. Select a proper disassembly bolt (inner hexagon bolt recommended) based on the motor model.
 2. Use an Allen wrench to screw down the screw clockwise until the A-A end of the flat key is detached from the keyway, as shown below.



2.2 Removing the Motor Oil Seal

- Tools needed: a pair of needle-nose pliers, a pair of slip-proof gloves, and a piece of cotton cloth.
- Disassembly procedure:
 1. Put the cotton cloth onto the supporting point B to avoid the end cover from being scratched during disassembly.
 2. Secure the motor and use the needle-nose pliers to hold point A of the oil seal lip.
 3. Pry the oil seal out gradually against the supporting point B.





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