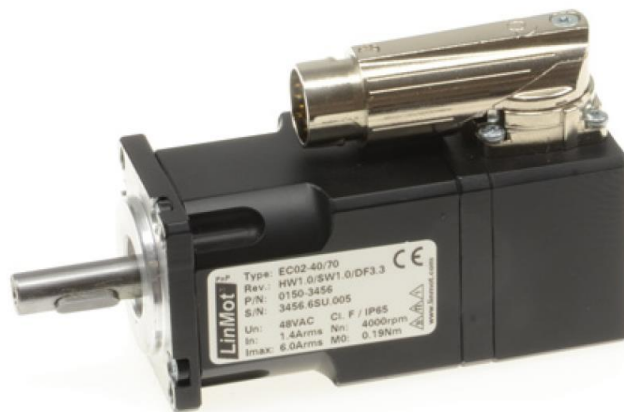


Installation Guide

Servo Motors

EC02-40

ENG



Content

1	General information	3
1.1	Introduction	3
1.2	Explanation of symbols	3
1.3	Qualified personnel	3
1.4	Liability	3
1.5	Copyright.....	3
2	Safety Instructions	4
3	Use as directed	5
4	Mechanical Installation	5
4.1	Installation Instructions	5
4.2	Fitting and Removing of Drive Components	6
5	Electrical Installation	7
5.1	Safety Instructions	7
5.2	Electrical Installation Guide	7
5.3	Pin Assignment of the Servo Motor	7
6	Setup	8
6.1	Safety Instructions	8
6.2	Setup Guide	8
7	Maintenance and Test Instructions	8
7.1	Servo Motor Checking	8
7.2	Maintenance	8
7.3	Inspection.....	9
7.4	Cleaning.....	9
7.5	Repairs.....	9
8	Transport	9
9	Storage	9
10	Dimensions	10
11	Declaration of Conformity and CE-marking	11

1 General information

1.1 Introduction

This manual includes instructions for the assembly, installation, maintenance, transport, and storage of EC02 Brushless Servomotors. The document is intended for electricians, mechanics, service technicians, and warehouse staff.

Read this manual before using the product and observe the general safety instructions and those in the relevant section at all times.

Keep these operating instructions in an accessible place and make them available to the personnel assigned.

1.2 Explanation of symbols



Triangular warning signs warn of danger.



Round command symbols tell what to do.

1.3 Qualified personnel

All work such as installation, commissioning, operation and service of the product may only be carried out by qualified personnel.

The personnel must have the necessary qualifications for the corresponding activity and be familiar with the installation, commissioning, operation and service of the product. The manual and in particular the safety instructions must be carefully read, understood and observed.

1.4 Liability

NTI AG (as manufacturer of LinMot and MagSpring products) excludes all liability for damages and expenses caused by incorrect use of the products. This also applies to false applications, which are caused by NTI AG's own data and notes, for example in the course of sales, support or application activities. It is the responsibility of the user to check the data and information provided by NTI AG for correct applicability in terms of safety. In addition, the entire responsibility for safety-related product functionality lies exclusively with the user. Product warranties are void if products are used with stators, sliders, servo drives or cables not manufactured by NTI AG unless such use was specifically approved by NTI AG.

NTI AG's warranty is limited to repair or replacement as stated in our standard warranty policy as described in our "terms and conditions" previously supplied to the purchaser of our equipment (please request copy of same if not otherwise available). Further reference is made to our general terms and conditions.

1.5 Copyright

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2 Safety Instructions



Read this documentation before assembly and setup. Incorrect handling of the motor can result in injury and damage to persons and property. Always comply with the technical data and the information on connection requirements (rating plate and documentation).



The person carrying out installation is required to perform risk assessment for the machine and to take appropriate measures to ensure that unforeseen movements will not cause injury or damage to persons or property.



Grounding

Make sure that the motor housing is adequately earthed to the reference earth busbar. No electrical safety can be guaranteed for persons without a low-resistance earth connection.



Do not unplug the motor connector during operation. This could create severe injury, or extensive material damage.



Power connections may be live even when the motor is not turning. Never unfasten the motor power connections while the equipment is under power. In unfavourable situations this can cause flashovers, with resulting injuries to persons and damage to property.



After disconnecting the servomotors from the supply voltage, wait several minutes before touching any components which are normally live (e-g- contacts, screw connections) or opening any connections. To be quite safe, measure the voltage in the intermediate circuit and wait until the voltage has fallen below 40V.



Burn hazard

The surfaces of the motors can be very hot during operation, according to their protection category. The surface temperature can exceed 100°C. Measure the temperature, and wait until the motor has cooled down to below 40°C before touching it.



Remove any key (if present) from the shaft or fasten it if the motor is running independently, to avoid the danger of injury due to the key being thrown out by centrifugal force.



Built-in holding brakes do not guarantee the safety of personnel! Hanging loads (vertical axes) require an additional, external mechanical brake to guarantee the safety of personnel.



Repairs must only be carried out by the manufacturer or by authorised repair workshops. Unauthorised opening and poorly performed repairs may result in injury or material damage, and will invalidate the warranty.



The motors are not designed to be connected directly to the three phase power supply, but must be operated using an electronic frequency converter. Direct connection to the mains can cause damage to the motor.

3 Use as directed

- The EC02 series of synchronous servomotors is designed specifically for industrial robots, machine tools, textile and packing machinery and other similar devices with high dynamic requirements.
- Only operate the motors under the conditions defined in this documentation.
- The EC02 motors must not be operated in environments with caustic acids and bases.
- The EC02 motors must not be used in applications involving direct contact with food and beverages.
- The motors are installed as components in electrical apparatus or machines and can only be commissioned and put into operation as integral components of such apparatus or machines.
- The thermal safety contact integrated in the motor windings must be analysed and monitored.
- The holding brakes are designed as standstill brakes and are not suited for repeated operational braking.
- The conformity of the servo-system to the standards mentioned in the EC Declaration of Conformity is only guaranteed if original components are used and the conditions set down in this manual are complied with.

4 Mechanical Installation

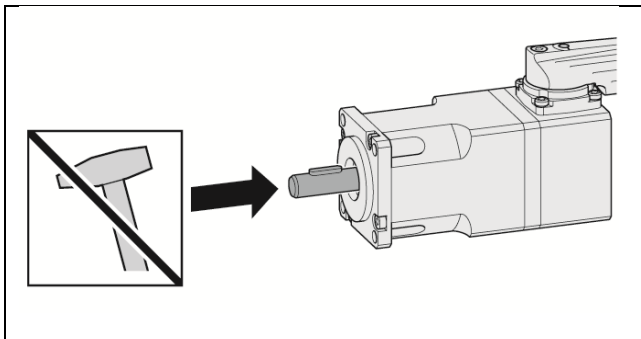


The dimensions of the motors can be found in chapter 10.

4.1 Installation Instructions



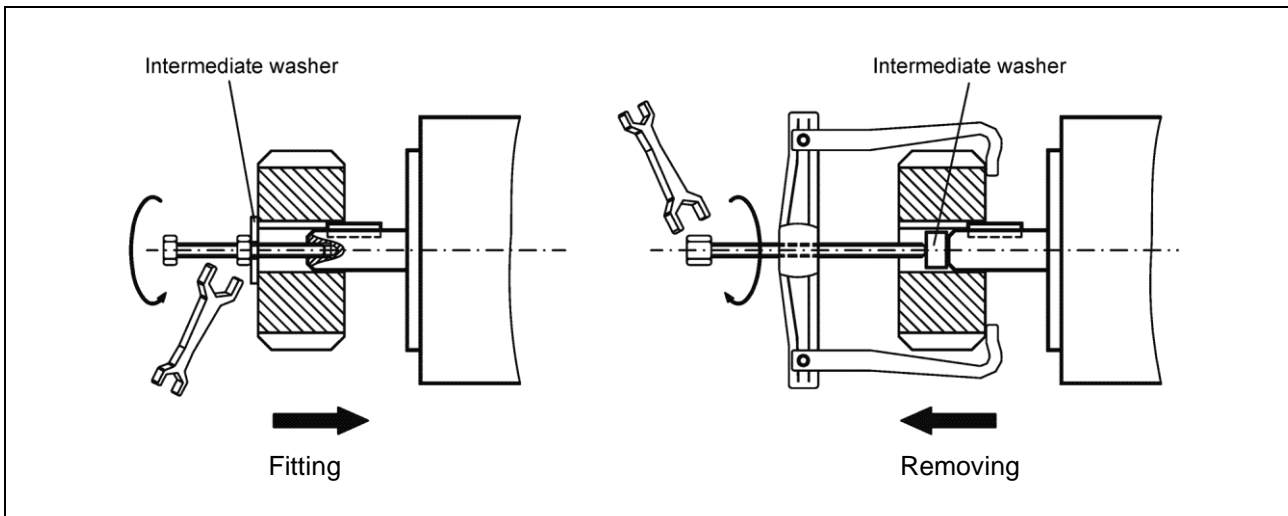
- Only qualified staff with knowledge of mechanical engineering are permitted to install the motor.
- Protect the motor from unacceptable stress. Take care, particularly during transport and handling, that components are not bent and that insulation distances are not altered.
- The installation site must be free of conductive and aggressive materials. For V3 mounting (shaft end upwards), make sure that no liquids can enter the bearings.
- Ensure free ventilation of the motors and observe the permissible ambient and flange temperatures. For ambient temperatures above 40°C please contact our technical department to request derating. Ensure that there is adequate heat transfer in the surroundings and the motor flange, so that the maximum permissible flange temperature is not exceeded in S1 operation.
- Servomotors are precision equipment. The flange and shaft are especially vulnerable during storage and assembly - so avoid using brute force. Use the locking thread provided for the motor shaft (see figure) to fasten drive components such as gear wheels or pulley wheels. Blows or the use of force will lead to damage to the bearings and the shaft.
- If the brake is present, **no axial loads must be used**, to prevent modification of the brake settings.



No pressure to the shaft!

Do not apply pressure to the shaft.
The failure could cause damage.

4.2 Fitting and Removing of Drive Components



- Make sure that the coupling is correctly aligned. Any displacement will cause unacceptable vibration and may result in destruction of the bearings and the coupling itself.
- When used with toothed belts or pulleys, observe the permissible radial forces. An excessive axial load on the shaft will significantly shorten the life of the motor. Whenever possible, avoid axial stress on the drive shaft. Axial load on the shaft will significantly shorten the life of the motor.
- Check compliance with the permitted radial and axial forces F_{radial} and F_{axial} .
 F_{radial} @ 4000 rpm: 220 N
 F_{axial} @ 4000 rpm: 80 N

5 Electrical Installation



- Wiring diagrams can be found in the instruction manual for the LinMot servo drives.

5.1 Safety Instructions



- Only qualified staff with training in electrical engineering are permitted to wire the motor.
- Always make sure that the motors are de-energised during assembly and wiring, i.e. no voltage must be switched on in the equipment to be connected.
- Make sure that the electrical cabinet has been safely turned off (barrier, warning signs, etc.). The individual voltages will only be turned on again during setup.
- Never unfasten the motor power connections while the equipment is under power. Dangerous voltages may still be present in the servo amplifier capacitors several minutes after the mains power supply has been switched off.
- Measure the voltage in the intermediate circuit and wait until the voltage has fallen below 40V. Control and power connections may be live even when the motor is not turning.

5.2 Electrical Installation Guide

- Check that the servo amplifier and the motor match each other. Compare the rated voltage and rated current in the units.
- Ensure that earthing of the servo amplifier and motor is carried out properly. Make sure that shielding and earthing comply with electromagnetic compatibility requirements. Earth the mounting plate and motor casing.
- Connect up all shielding via a wide surface-area contact (low impedance) and metallised connector housings or EMC-compatible threaded cable gland.
- Check the quality of earthing periodically.

5.3 Pin Assignment of the Servo Motor



Do not connect or disconnect motor when there is power on the servo drive. Use only original LinMot cable. Cables from other sources must be checked precisely before commissioning. Incorrect connections can destroy the drive and servo motor.

	PIN
Phase U	A
Phase V	B
Phase W	C
+5VDC	1
GND	2
Sin.	3
Cos.	5
Comm.	7
Earth	10
Brake+ (Option)	11
Brake- (Option)	12
Pin Assignment	

6 Setup

6.1 Safety Instructions



- Only specialist personnel with extensive technical knowledge are allowed to commission the drive unit with servo amplifier/motor.
- Check that all live connection points are safe against accidental contact. Deadly voltages of up to 900V can occur.
- Never unfasten the motor power connections while the equipment is under power. Dangerous voltages may still be present in the servo amplifier capacitors several minutes after the mains power supply has been switched off.
- The surface temperature of the motor can exceed 100°C in operation. Check (measure) the temperature of the motor. Wait until the motor has cooled down to 40°C before touching it.
- Make sure that, even if the motor starts to move unintentionally, no danger can result for personnel or machinery.

6.2 Setup Guide

The setup procedure is described as an example. A different method may be appropriate or necessary, depending on the expected use.

- Check the assembly and orientation of the motor.
- Check that the actuator components are in their proper housings and have been set correctly (respecting the permissible radial and axial forces).
- Check the wiring and connections to the motor and the servo amplifier. Ensure that earthing has been carried out properly.
- Check that the holding brake, if there is one, is working properly (the brake must release when 24V is applied).
- Check whether the motor rotor can turn freely (first release the brake, if there is one). Listen for grinding noises.
- Check that the required measures against accidental contact with live and moving parts have been taken.
- Carry out any further tests which are specifically required for your system.
- Commission the motor according to the setup instructions for the servo drive.
- In multi-axis systems, individually commission each servo amplifier/motor drive unit at minimum performance levels.
- Only perform complete testing after you have ensured that all components and settings are suitable.

7 Maintenance and Test Instructions

7.1 Servo Motor Checking

To check the servo motors, the ohmic resistances between the individual connector pins can be measured. If the measured values are outside the tolerance of +/- 10% of the listed values, the servo motor could be damaged (listed values measured at 20°C).

Phase / Phase	Pin A-B / B-C / A-C	2.4 Ω
5VDC / GND	Pin 1 / Pin 2	2.7 Ω
Sin / GND	Pin 3 / Pin 2	>20 MΩ
Cos / GND	Pin 5 / Pin 2	>20 MΩ
Comm. / GND	Pin 7 / Pin 2	12.8 kΩ

7.2 Maintenance

- The ball bearings should be replaced after 20.000 working hours of operation under rated conditions.
- Check the motor for bearing noise every 2.500 working hours or once a year.
- If noises are heard, stop using the motor. In this case, the bearings must be replaced.

7.3 Inspection

- Periodically check that the connectors and earthing connection are tightly locked.
- Check the brake periodically for wear and sealing.
- Check the thermal protection periodically to ensure it is working properly.

7.4 Cleaning

- Keep the external housing clean and free from oil, grease or dirt that will prevent proper heat dispersal.
- Clean with alcohol or similar, do not immerse or spray.

7.5 Repairs

Repair of the motor must only be carried out by the manufacturer or by authorised workshops. Opening the motor invalidates the warranty.

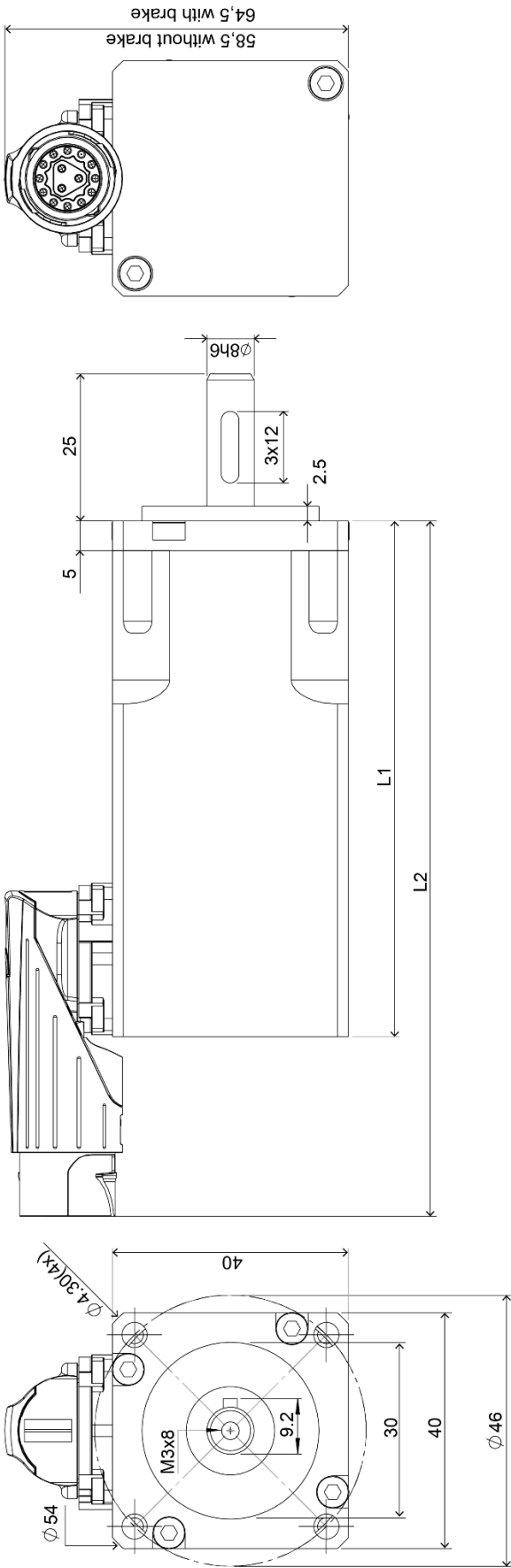
8 Transport

- Transport temperature: -25 to +70°C, maximum variation 20K/hour.
- Atmospheric humidity during transport: relative humidity 5% - 95%, no condensation.
- Only by qualified personnel.
- Use the manufacturer's original recyclable packaging.
- Avoid impact, in particular on the shaft end.
- If the packaging is damaged, check that there is no visible damage to the motor. Inform the carrier and, if necessary, the manufacturer.

9 Storage

- Climate category 1K4 according to EN 61800-2
- Storage temperature: 0 to +55°C, maximum variation 20K/hour.
- Atmospheric humidity: relative humidity 5% - 95%, no condensation.
- Store in the manufacturer's original recyclable packaging.

10 Dimensions



Motor type	EC02-40/70		EC02-40/140	
	without brake	with brake	without brake	with brake
L1	87.5	119.5	105.5	137.5
L2	118.5	150.5	136.5	168.5
	mm			
	mm			

11 Declaration of Conformity and CE-marking

Wir
We
Nous

NTI AG
Bodenaeckerstrasse 2
8957 Spreitenbach

erklären in alleiniger Verantwortung, dass das Produkt
declare under our sole responsibility that the product
declarons sous notre seule responsabilité que le produit

Product	Item-No.
EC02-40/70	0150-3456
EC02-40/140	0150-3457
EC02-40/70-B	0150-3460
EC02-40/140-B	0150-3461

konform ist mit den Anforderungen der Richtlinien,
is conform to the provisions of directives,
est conforme aux exigences des directives,

2014/30/EU (EMC)

gestützt auf die folgenden Normen,
based on the following standards,
base aux normes suivants,

EN61000-6-2:2016
EN61000-6-4:2006

Jahr der CE-Kennzeichnung:

Year of CE marking:

Annee du marquage CE: **2017**

Spreitenbach, 07.01.2022



Dr.-Ing. Ronald Rohner
CEO NTI AG

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