

# Instruction manual

for machine door actuator

## NT/NTiB



**Instruction manual for the NT/NTiB machine door actuator**

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Technical modifications reserved.

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# 1 About this manual

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## Intended readership

This manual is designed for operators and users of an automatic SERVAX machine door actuator and assumes that the latter has been installed and tested by competent personnel and is therefore ready for operation.

## Scope of application

This document applies to the automatic doors of machine tools and industrial machines fitted with the following machine door actuators:

**NT-4, NT-10, NT-14, NT-25, NT-35 and NTiB-2, NTiB-4**

referred to below as “NT”.

## Key to symbols



This symbol has been used throughout the document to highlight any passages relevant to your safety. Its purpose is to warn against hazardous situations of a general nature.



This symbol is used to warn against perilous electrical voltages or currents.



This symbol is used to highlight all passages that are critical to the proper functioning of the equipment. Failure to comply may result in material damage or destroy the equipment beyond repair.



Functions highlighted using this symbol indicate basis settings but can be reprogrammed by the machine manufacturer using our DoorManager software.



This symbol indicates optional components, which are not available with all types of equipment.

*Useful tips on how best to proceed or regarding any preliminary steps to be taken appear like this in italics.*

## Languages

This instruction manual is available in various languages. Please contact us for further information.



## 2 Safety

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### 2.1 General safety regulations and accident prevention rules



You must read and digest the contents of the instruction manual before operating the machine door actuator!

#### Intended use

You must always observe any specially highlighted safety information (for key to symbols, see Section 1) contained within this document! The SERVAX NT machine door actuator is a device used to automate the movement of machine doors and thus eliminate any additional hazards.

This drive has been built using state-of-the-art technology in accordance with recognised safety regulations and is intended solely for use within the context of standard industrial applications.

If the drive is to be used for any other purpose, the manufacturer must be consulted, otherwise no liability for injury to persons or damage to the system can be accepted. Use of the drive for any purpose above and beyond its intended use is deemed not as intended and may result in personal injury to the user or a third party as well as damage to the system.

#### Basic safety measures - Correct behaviour

Only operate the system when it is in full working order. Faults which may adversely affect safety must be rectified immediately.

Incorrect operation of the machine door actuator or the machine door actuator system will:

- Endanger the life of the user or third parties/induce a risk of injury.
- Damage the system or other property.

#### Regulations to be observed

The operating, maintenance and installation conditions specified by the manufacturer must be observed. The machine door actuator may only be maintained and repaired by specialist personnel who are familiar with the device and have been informed of the possible hazards. Any generally applicable regulations governing health and safety at work as well as any other statutory rules for preventing accidents in force in the country where the door actuator system is operated apply in addition to the instruction manual.

The buyer, designer and/or installation engineer of the NT machine door actuator is responsible for ensuring that the actuator is used correctly and in accordance with health and safety requirements. He must ensure compliance with all national and local legislation and rules governing the safety of power-operated doors as well as the applicable national regulations governing health and safety at work.

## Liability

Landert Motoren AG is not responsible for accidents and/or consequential damage that may arise as a result of using the NT machine door actuator. Our maximum liability and warranty is limited to the reimbursement of costs for the sold product and only applies in cases of gross negligence or intent on the part of Landert Motoren AG. Landert Motoren AG does not provide any specifications or application recommendations for specific machine door concepts. The buyer, designer and/or installation engineer of the NT machine door actuator must decide whether the drive is suitable for a particular application. In addition, Landert Motoren AG accepts no responsibility for damage or injury caused by alterations to the drive, including modifications to software parameters. Landert Motoren AG employees are not authorised to modify these conditions without written approval and a valid signature from the relevant authority.

## 2.2 Housekeeping

### Basic principles

Machine doors must be operated and maintained in a manner that guarantees the safety of the user, the maintenance personnel and other parties at all times.

If there is a fault with the safety equipment (e.g. photoelectric barriers ♦, sensitive edge ♦), it must not be deactivated for the purpose of enabling continued operation of the doors.

### Carrying out work on the machine door actuator

All persons responsible for operating, inspecting and servicing machine doors must be properly qualified to do so and must have the necessary instructions (instruction manual) to hand.

Personnel responsible for carrying out work on the system must have read and digested the instruction manual before starting work.

Mechanical and electrical work on the machine door actuator system and control system must only be carried out by our specialist personnel or by experts who have sought advice from our specialist personnel.

All other persons are prohibited from carrying out repair or modification work on the system.

## 2.3 Safety equipment

### Internal obstacle detection

During opening and closing, the movement of the door is monitored detectio by highly-sensitive sensors, which can independently detect any obstacle in the path of the machine door. If this obstacle blocks the door during closing, the drive stops immediately and reverses by a preset value (♣), providing personnel with effective protection against getting caught in the door. If the door opens, the drive is braked and maintains its current position.

### Photoelectric barrier ♦, Sensitive edge ♦

If an external safety device is activated during the closing operation (sensitive edge ♦, photoelectric barrier ♦, etc.), this signal will trigger a reversing movement according to a preset value.

### Emergency stop function ♦



#### Function (Installation in accordance with country-specific regulations.)

Pressing the emergency stop button brings the door to an immediate standstill. Once the button has been pressed, the wing of the door can move freely. The drive will not execute motion commands whilst the emergency stop function is active. Normal operation will only be resumed once the function has been reset.

*Various methods are available for resetting the emergency stop function depending on the type of machine. For details, please refer to the instruction manual for the machine tool or industrial machine concerned.*



# 3 Area of application and overview

## NT area of application

The NT machine door actuator is used to open and close machine doors on machine tools or other industrial machines operated by personnel or robots automatically.

## Individual blocks

The NT drive system consists of a gearless, maintenance-free direct drive motor featuring high IP65 (NTiB) and IP54 (NT) protection and a separate control system (servo controller). Depending on the design of your machine tool or industrial machine, the motor (1) is mounted on the machine using a bracket, spacer tube or similar and is connected to the machine door using one of the following options:

### Rack

A rack driven by a spur wheel mounted on the shaft end of the drive motor is mounted on the machine door. The drive system has a protective cover.

### Toothed belt

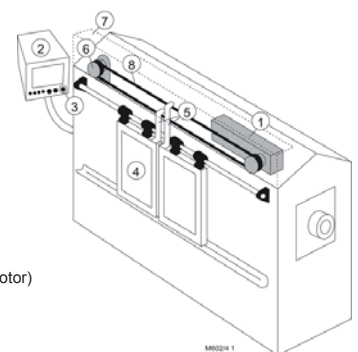
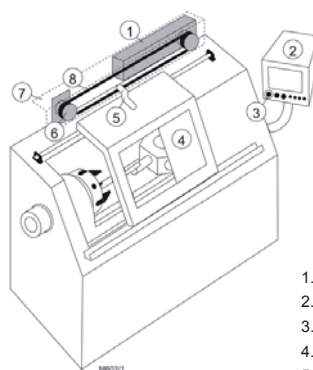
The machine door (4) is connected to the toothed belt (8) via a mounting bracket (5), which runs via the idle pulley (6) and drive wheel. The drive system has a protective cover (7).

### Chain

The machine door (4) is connected to the chain (8) via a mounting bracket (5), which runs via the idle pulley (6) and sprocket. The drive system has a protective cover (7).

Ideally, the motor control system should be installed in the control cabinet on the machine side and connected to the motor via two extension cables, one for the motor power and one for the shaft encoder. For NTiB drives, motor and control unit are enclosed together in a single watertight box

### Examples of toothed belt connection



1. Drive motor NTiB (box), NT (motor)
2. Machine tool PLC
3. Emergency stop button
4. Machine door
5. Mounting bracket
6. Idler pulley
7. Protective cover
8. Toothed belt

## Changing the settings

The NT machine door actuator has been parameterised according to individual customer requirements during commissioning and optimised to suit your machine.

*If operating conditions change, the system can be reconfigured for the new conditions by the machine manufacturer using our DoorManager programming software.*

# 4 Operation

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## Switching on the system

- Switch on the mains voltage (system switch).

## Homing

*In the case of horizontal doors, a homing operation must be performed every time the system is switched on, as the door may be in an undefined position. This is not necessary for vertical doors, as the door is always at the lower end stop due to its weight.*

- Issue opening command, wait until the door has reached the CLOSE position:
  - The door will move slowly until it reaches the CLOSE end stop.
- Issue closing command, wait until the door has reached the CLOSE position:
  - The door will move slowly until it reaches the CLOSE end stop.

*When the system is switched on, the CLOSED end stop is approached in order to locate the zero point. During this operation, internal obstruction detection is active. Consequently, the door will not be able to determine whether it has hit an obstruction or reached the end stop. It is therefore necessary to confirm whether the stop position reached is due to an obstruction or to the end stop.*

- Use the appropriate control (acknowledge) on your machine control system to confirm that the correct stop position has been reached.

## Request fault indication ♦

- Request on-screen fault indication and/or take note of warning lights or LEDs:
  - Once the homing operation is complete, no warning or fault messages should be present.

The machine door actuator system is now ready for operation.

## Recommissioning

If a machine door actuator system has not been in use for a considerable amount of time, it must be inspected in accordance with Section 5.2 prior to recommissioning and, if necessary, repaired, in order to guarantee the safety of personnel at all times.

## Normal operation

The NT machine door actuator safeguards the automatic opening and closing of machine doors. The machine door can be activated manually or automatically:

- Automatic activation via the machine control system (PLC)
- Manual operation via keys ♦, touch screen ♦, keypad ♦, etc.

## **OPENING**

The door opens fully and remains in this position. During this operation, the door may move in the run-in path to the stop position at reduced speed (depending on settings defined).

## **CLOSING**

The door closes fully and remains in the CLOSE position, always moving to the mechanical CLOSE end stop. During this operation, the door may move in the run-in path to the stop position at reduced speed (depending on settings defined).

## **Reduced OPENING or Reduced CLOSING ♦**

The Reduced OPENING and Reduced CLOSING commands are used to move the door to a defined intermediate position and hold it there.

*The reduced opening width was also programmed during commissioning of the system and can be modified subsequently by machine specialists or the drive manufacturer if requirements change.*

## **Free running (manual operation)**

The FREE RUNNING command is used to activate the drive; the door can be opened or closed manually.



The drive will not execute motion commands whilst the Free running function is active. If FREE RUNNING is reset with the door open, a closing command must be executed in order to ensure that the door returns to the CLOSE end stop and remains there.

# 5 Maintenance

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- The responsibilities of personnel for maintenance work must be clearly specified.
- Keep hands and other parts of the body away from moving parts.



Replacement parts must meet the technical requirements specified by the manufacturer. Original replacement parts must be used.

## 5.1 Maintenance carried out by the machine manufacturer

### Maintenance interval



The maintenance interval is stipulated in the service contract for the machine tool or industrial machine. However, maintenance must be carried out at least once a year by a specialist.

### Requirements to be met by maintenance personnel

Experts are personnel, who through specialist training and experience have sufficient knowledge of power-operated doors and are familiar enough with the relevant accident prevention regulations, directives and generally recognised regulations regarding technology to assess the operational safety of power-operated doors. Such personnel include, for example, skilled workers who work for the manufacturer or supplier and appropriately trained skilled workers who work for the operator.

Specialists must perform an objective assessment from the point of view of accident prevention, without any influence from other factors, e.g. cost-effective requirements.



Maintenance of electrical parts must be carried out by an electrician working in accordance with the specified regulations. There must be visible isolation between the mains and machine door actuator, either by removing the mains plug or via a system switch with an OFF position that can be locked.

### Scope of maintenance work

A list of the maintenance work to be carried out can be found in the *NT/NTiB System manual, document reference no. M-650 (M-650/1)*.

## 5.2 Inspections performed by the operator

### Inspection interval



An inspection must be carried out periodically at least once every three months.

### Scope of inspections

The operator of an automatic machine door actuator system must check the operation of the machine door and the safety equipment at periodic intervals. This ensures that functional errors or hazardous changes to the system are detected at an early stage.



If defects are detected during the course of periodic inspections, the manufacturer of the machine tool or industrial machine should be contracted to correct them immediately.



When carrying out these inspections the possibility of system malfunction must always be taken into consideration. If there is insufficient space available, operational checks may not be carried out manually; a suitable object made from wood, rubber or similar material must be used.

The maintenance work to be carried out by the operator only takes a minimal amount of time, but is essential for safe and error-free system operation.

The maintenance work to be carried out by the operator includes:

### Rack connection

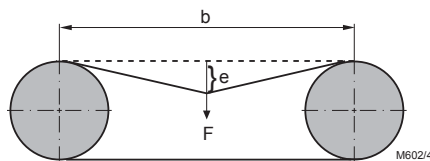
Inspections and maintenance work must be carried out in accordance with the instructions of the machine tool or industrial machine manufacturer.

### Toothed belt connection

Check toothed belt tension

*Maintaining the optimum toothed belt tension ensures error-free engagement of the belt in the toothed belt pulley, optimises power transmission and minimises wear on the toothed belt and bearings.*

- Remove protective cover (7) (see diagrams in Section 3).
- Take measurement (b): Measure distance between centre of idle pulley (6) and centre of drive wheel on the motor (1).



- Use the following formula (e) to perform the calculation:  $e \text{ [mm]} = 0.015 \times b \text{ [mm]}$
- Attach a spring balance to the centre of the toothed belt and apply sufficient force to stretch the toothed belt by the calculated value (e). Read off the force (F) required.

Check with the machine manufacturer or contact the manufacturer of the machine door actuator directly (see last page for address) to find out whether the belt is correctly prestressed on the basis of the value measured.



If it is not correct, ask to speak to the machine manufacturer's Service department immediately.

- Reinstall protective cover (7).

### Chain connection

Inspections and maintenance work must be carried out in accordance with the instructions of the machine tool or industrial machine manufacturer.

### Inspect guide rails

- Use a suitable detergent to remove any residue or deposits from the guide rails.
- Check that the machine door opens and closes smoothly and does not scrape against anything.

## Check system for signs of excessive wear



- Check the machine door actuator system for any visible external damage and defects.

If there are excessive rubber (toothed belt), steel or aluminium (gear wheels, idle pulley, door wings, drive support) deposits on the floor around the system, contact the machine manufacturer's Service department immediately so that the system can undergo a thorough inspection.

## Check the operation of the system

### Control signals, pushbuttons

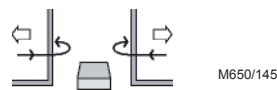
- Check the basic functions in accordance with the machine manufacturer's data.

### Emergency stop function ♦

- Press the "emergency stop" button:
  - The door is enabled for manual operation; the door wings can now move freely.
- Reset the "emergency stop" function according to the machine manufacturer's instructions:
  - The door is now ready for normal operation again.

### Internal obstacle detection

- Place obstruction (foam pad or similar) in the way of the door to prevent closure (make sure that the beam of the photoelectric barrier ♦ is not interrupted); issue closing command.
  - As soon as the door makes contact with the obstruction, it will reopen immediately. The next time a closing command is issued, the door will close, provided that the obstruction has been removed.



*Obstacle detection is active, even when the door is in the process of opening (e.g. obstacle gets caught on door handle), with the result that the door stops momentarily upon contact with the obstacle but does not reverse.*

### External obstacle detection (photoelectric barriers, sensitive edge, etc.) ♦

- Use an appropriate object to interrupt the beam of the photoelectric barrier/touch the sensitive edge during the closing movement:
  - The door reopens immediately.

## 6 Troubleshooting

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The NT machine door actuator control system carries out continuous self-diagnosis. Depending on the type of machine tool or industrial machine concerned, warnings and faults that occur may be signalled by means of LEDs flashing intermittently on the control system itself or by the machine control system (warning lights, text message on display). For further information, please refer to the instruction manual provided by the machine manufacturer.

Fault	Possible cause	Action
No response.	System not connected to power supply.	Check that supply voltage supply is connected and that green LED H3 is illuminated.
No response.	EMERG. STOP is active.	Check for signal ENPO X2/7 and ensure that LED H2 is flashing.
Drive not moving and red LED H1 flashing.	Control system fault or malfunction.	1. Reset control system using mains OFF. 2. Consult manufacturer.
Motor overheats and cuts out.	Door has hit an obstacle in the vicinity of the end stops.	Check the entire traverse path for small obstacles and for dirt on the end stops.
Motor overheats and cuts out.	Cycle times too long.	Seek manufacturer approval of selected cycle times.
Door detects obstacle when none exists.	Excessive friction.	Clean door guide rails and ensure that the door can move freely.
Drive oscillates violently.	Mechanical characteristics of system have changed.	Check belt tension and ensure that door is not being subject to additional load.

# 7 Additional information

## 7.1 Technical data

Drive type		NT-4	NT-10	NT-14	NT-25	NT-35	NTiB-2	NTiB-4
Door weight, horizontal	kg	80	150	250	400	600	40	80
Door weight, vertical <sup>1</sup>	kg	13	25	35	65	100	-	-
Max. displacement dist.	mm	∞	∞	∞	∞	∞	∞	∞
Max. speed	m/s	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Rated torque, motor	Nm	4.2	10	14	25	35	2	4.2
Peak torque, motor	Nm	9	20	34	50	75	4	9
Max rated speed, motor	rpm	1000	750	750	450	450	1000	1000
Weight, motor <sup>2</sup>	kg	4	6	7	13	17	14	14
Degree of protection <sup>3</sup>	IP	54	54	54	54	54	65	65

<sup>1)</sup> Guide values; with vertical operation, the motor is capable of maintaining the door weight specified in the upper end position.

<sup>2)</sup> With NTiB-2/4, weight is for the complete unit.

<sup>3)</sup> NT: degree of protection IP65 for motor only; with NTiB-2/4, degree of protection IP65 is for the complete unit (box).

## 7.2 Environmental operating conditions

Characteristic	Motor	Servo controller
Temperature range	-10 ... 40° C	-10 ... 45° C; with power derating up to 55° C
Relative humidity	15 ... 85 %	15 ... 85 %; moisture condensation not permissible
Installation height	up to 1000 m above sea level, higher than 1000 m above sea level with power derating of 1% for every 100 m	up to 1000 m above sea level, higher than 1000 m above sea level with power derating of 1% for every 100 m

## 7.3 Warranty claims

Wilful or malicious damage to/contamination of system components renders all warranty claims null and void as does the modification of the drive and control system by third parties.

## 7.4 Disposal

At the end of its service life this system must be disposed of in accordance with national regulations. We recommend that you contact a company that specialises in this field.



Machine door actuator manufacturer:

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