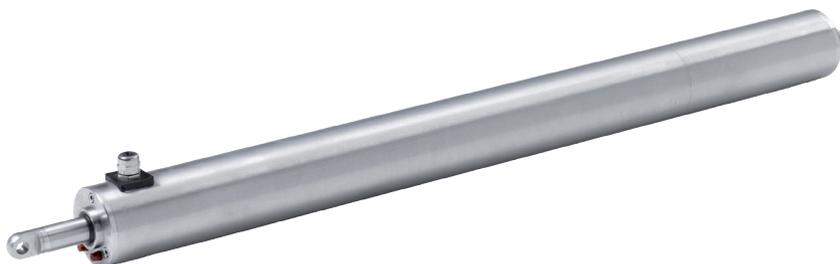


Econom 0 UL

Linearantrieb / Linear actuator / Motor lineal



- DE Montageanleitung**
Bitte bewahren Sie die Montageanleitung auf!
- US Operating instructions**
Please take care of the operating instructions!
- MX Instrucciones de montaje**
Por favor, conserve estas instrucciones de montaje!

DE Die deutsche Montageanleitung ist die Originalfassung.

Alle anderssprachigen Dokumente stellen Übersetzungen der Originalfassung dar.

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1 General



WARNING

Danger of injury in connection with the operation of the linear actuator. Irreversible injury or death may occur as a result of incorrect installation or incorrect operation of the linear actuator.

- When installing and operating the Econom linear actuator all requirements for safety specified in the installation instructions and the applicable national laws and regulations of the country of operation must be observed. In addition, all national and international regulations and other binding regulations governing operating safety, accident prevention and environmental protection applicable in the country of operation must be observed.

1.1 Standards and guidelines

The design of the Econom linear actuator conforms to the basic occupational health and safety requirements of the applicable laws, standards and directives. All information relating to safety in these installation instructions refers to the laws and regulations that are currently valid in Germany. All information in these installation instructions must be complied with at all times and without limitation. In addition to the safety notices and directions in these installation instructions, the regulations applicable at the place of installation with regard to accident prevention, environmental protection and occupational safety must be observed and adhered to.

1.2 Information relating to the installation instructions

The classification of the contents is based on the life stages of the linear drive (hereinafter referred to as the “device”). The manufacturer, elero GmbH Linearantriebstechnik (for the address see back cover), reserves the right to make changes to the technical data in the installation instructions without prior notice to customers. In detail these can differ from the respective version of the device without the factual information being fundamentally changed and without losing their validity. The current status of the technical specifications can be requested from the manufacturer elero GmbH Linearantriebstechnik (for address see back cover) at any time. Any claims arising from this cannot be asserted. Deviations from the text and pictorial statements are possible and are dependent on the technical development, equipment and accessories of the device. The manufacturer elero GmbH Linearantriebstechnik (for address see back cover) shall provide information about any differing details relating to special versions by means of the sales documentation. Other specifications shall remain unaffected by this.

1.3 Information on tools

All tool sizes referred to in the instructions refer to tools in metric units. The use of tools other than those named may cause injuries or property damage.

1.4 Terms

The following terms are applicable for the application of this document.

1.4.1 Qualified, trained and authorized technicians

Trained person who has been informed of the assigned tasks and potential dangers in the event of incorrect operation and if necessary qualified and familiar with the required safety devices and protective measures. The person must be authorized to carry out the required work by a supervisor.

1.4.2 Static load

External force that is exerted on the device at standstill.

1.4.3 Static self-locking

The device will not start moving from a standstill without actuation.
Requirement: the maximum allowable force must not be exceeded.

1.4.4 Dynamic self-locking

After shutdown the device automatically comes to a stop.
Requirement: the maximum allowable force must not be exceeded.

1.4.5 Personal protective equipment (PPE)

Any device or item that is designed to be worn by a person, and that is intended to protect the person from one or more risks that could endanger their health and safety.

1.4.6 Person who is authorized to work on electrical systems

Person who based on the technical (electrical) training has knowledge of and experience with the relevant standards and regulations and can assess the assigned work and recognize potential dangers.

1.4.7 Electromechanical push-rod actuator

Device for generating mechanical processes with the assistance of electrical actuators that convert a rotary motion to a straight motion.

1.4.8 **Overcurrent protective device**

Interrupts an electrical circuit if the electrical current exceeds a defined level for a specific period.

1.4.9 **Traverse path**

Path through an object travels from point A to point B regardless of direction

1.4.10 **PE conductor**

Protective conductor, equipotential conductor

1.4.11 **Radial or torsion forces**

Radial force describes a lateral force exerted on a component. Torsion force describes twisting force on a component.

1.4.12 **Limit switch**

Sensors that detect when a moving object has reached a specific position.

1.4.13 **Thermal protection switch**

Temperature-dependent bimetallic switch in the motor winding in 1 AC and 3 AC types.

1.4.14 **Loop current**

Current applied to the loop of the potentiometer

1.4.15 **Allowable stroke distance**

Allowable distance that an object may travel from point A to point B regardless of direction. The length of the allowable stroke distance is specified on the name plate at "stroke".

1.4.16 **Heating element based on PTC**

PTC thermistor heating element

1.4.17 **Device protection types**

All devices are supplied with the device protection type specified on the name plate. This information conforms to the specifications in accordance with DIN EN 60529. Corresponding information for the American market can be found in the appendix 6.2.

1.4.18 **SAFE principle**

Term for the structure of safety instructions.

- Signal word - provides information on the severity of the anticipated danger
- Nature and source of danger - provides information on the source of the danger
- Consequences - provides information on the consequences of the danger
- Avoidance - provides instructions on how the danger can be avoided

1.4.19 **Near-accident**

An incident that could almost have caused physical injury.

1.4.20 **Integrator**

The person who integrates the linear actuator into the final product.

1.4.21 **State of the art**

"The state of the art is the development standard of advanced processes, equipment or operating methods that appear to be suitable in practice for a measure designed to limit emissions in air, water and ground, to guarantee system safety, to guarantee environmentally compatible waste disposal, or otherwise to prevent or reduce effects on the environment to achieve a high general level of protection for the environment in general".

1.5 **Intended use**

The device has been designed and manufactured for operation in mechanical engineering and construction. It serves as a means of adjusting small to medium loads. Other fields of application must be agreed in advance with the manufacturer, elero GmbH Linearantriebstechnik (for the address see back cover).

The device may not be used in areas where there is a risk of injury to personnel or in potentially explosive environments.

If a direct or indirect hazard to personnel cannot be ruled out, additional measures (such as covers, barriers, etc.) must be taken accordingly to minimize the potential risk.

The operator alone is liable for any damage arising from the non-intended use of the device. The manufacturer, elero GmbH Linearantriebstechnik (for the address see back cover), assumes no liability for personal injury or damage to property caused through misuse or procedural errors, improper operator control or improper start of operation.

The device must be operated by trained, qualified and authorized technicians in compliance with all safety instructions.

Correct use includes observation of and adherence to all safety instructions in the installation instructions and all applicable national regulations and the applicable laws for environmental protection. Use in compliance with the intended use also includes adherence to the operating regulations prescribed in these installation instructions. The operator is recommended have personnel confirm that they are familiar with the contents of the operating instructions in writing.

1.6 Foreseeable misuse

Foreseeable misuse is installation that is not in compliance with the purpose approved by the manufacturer, elero GmbH Linearantriebstechnik (for address see back cover) and an incorrect installation position.

1.7 Warranty and liability

In principle, the General Terms & Conditions of Sale and Delivery of the manufacturer, elero GmbH Linearantriebstechnik (for address see back cover), apply. The terms and conditions of sale and delivery are a component of the sales documentation and are given to the purchaser at the time of delivery.

If you have not purchased the device directly from elero GmbH Linearantriebstechnik (for address see back cover), please contact the manufacturer of the machine or the supplier of the device.

Liability claims for personal injury and damage to property are excluded, if they are attributable to one or several of the following causes:

- Opening of the device by the customer (breaking the seal)
- Use not in compliance with the intended use of the device
- Improper installation, start of operation or operator control of the device
- Changes to the design and construction of the device without the written approval of manufacturer, elero GmbH Linearantriebstechnik (for address see back cover)
- Operation of the device with improperly installed connections and defective or improperly attached safety and protection devices
- Non-compliance with the safety stipulations, notices and directions provided in these installation instructions
- Exceeding of the specified technical specifications

1.8 Customer service of the manufacturer

The device may be repaired only by the manufacturer, elero GmbH Linearantriebstechnik (for address see back cover), in the event of a fault. The address for sending in the device to the customer service department can be found on the inside of the back cover.

If you have not purchased the device directly from elero GmbH Linearantriebstechnik (for address see back cover), please contact the manufacturer of the machine or the supplier of the device.

Before removal of the device, the system must be locked by suitable equipment such as metal rods, locking pins or similar mechanical means to prevent personal injury or property damage during removal.

The device must not be separated from the machine by force.



The serial number will be required for all contact with customer service. This can be found in the top right-hand half of the type plate.

 elero GmbH Linearantriebstechnik D-07381 Pößneck		
Typ: Econom 0	Nr.: 110815	1
Hub: 100 mm	v_{Hub} : ca. 1,5mm/s	2
U_N : 24V-DC	S3- 15%	3
I_N : 2 A P: 48 W	f_N : - IP: 65	
F_{dyn} : 1500N	Bremse: 24V-DC	

Abb. 1 Example of a name plate

Serial number

Duty cycle (for explanation see Appendix 6.1)

Protection class (for explanation see Appendix 6.2)

2 Safety

2.1 General safety notices and directions

These installation instructions contain all safety instructions that must be observed in order to avoid and prevent dangers when working with the device. Safe use of the device is guaranteed when all of the specified safety notices and directions are complied with.

2.1.1 Formulation of the safety notices and directions

The safety instructions in this document are marked with danger signs and safety symbols and are structured in accordance with the SAFE principle (for definition see chapter 1.4.18 „SAFE principle“ on page 7). They contain specifications relating to the type and source of danger, the possible consequences, as well as the prevention of the danger.



“This is the danger sign. It warns the operator of danger of injury. Observe all directions marked with the danger sign to prevent injury or death“.

The following table defines the representation and description of the levels of danger with possible physical injury, as used in these installation instructions.

Symbol	Keyword	Meaning
	DANGER	Warns of an accident that will occur and cause death if the directions are not followed.
	WARNING	Warns of an accident that may occur, if the instructions are not followed, which can lead to serious, perhaps life-threatening, irreversible injuries or death.
	CAUTION	Warns of an accident that can occur, if the instructions are not followed, which can lead to minor, reversible injuries.

Safety

The following table describes the symbols used in these installation instructions for the graphic display of danger situations in connection with the symbol for the danger level.

Symbol	Meaning
	Danger due to an electrical voltage, electric shock: This symbol refers to dangers associated with electrical currents.
	Danger of crushing and killing people: This symbol refers to dangers due to which the entire body or individual limbs can become crushed or injured.

The following table defines the representation and description used in the installation instructions for situations in which damage can occur to the product or draws attention to important facts, statuses, tips and information.

Symbol	Keyword	Meaning
	<i>CAUTION</i>	This symbol warns of possible damage to property.
		This symbol draws attention to important facts and statuses, as well as to further information in these installation instructions. Furthermore, it refers to specific instructions which give additional information on or provide assistance in how to perform a procedure more easily.

The following is an example of the structure of a safety notice:



DANGER

Type and source of danger

Explanation of the type and source of danger

- Measures to avert danger.

2.2 Safety principles

The device is manufactured in accordance with the state of the art and the generally accepted rules of safety and it is safe to operate if the instructions in these installation instructions are observed and precautions are taken to prevent injury to persons and property damage. The design of the device and all information in the installation instructions conform to the basic occupational health and safety requirements of the applicable laws, standards and directives.

All specifications pertaining to safety relate to the currently valid regulations of the European Union. In other countries it must be ensured by the plant operator that the applicable laws and national regulations are complied with. Persons who work with the device must have the appropriate qualification specified in the country of operation.

In addition to the safety notices and directions in these installation instructions, the generally applicable regulations regarding accident prevention and environmental protection must be observed and complied with.

The device must only be used when in perfect working order, for its intended use, and in compliance with the safety notices and directions in these installation instructions. The operator of the device has sole responsibility. The device is designed for the application in accordance with the section "Intended use". In the event of use that is not in compliance with the intended use, injury to the life and limb of the user or third parties or impairments to the device and other property can arise. Accidents or near-accidents when using the device that lead to or could lead to injury to persons and/or damage to the work environment must be reported to the manufacturer, elero GmbH Linearantriebstechnik (for address see back cover), by the operator directly and subject to confirmation by e-mail or fax (for e-mail address and fax number see back cover).

All safety notices and directions specified in the installation instructions and on the device must be adhered to. In addition to these safety notices and directions, the operator must ensure that all national and international regulations applicable in the respective country of use, as well as other binding regulations relating to operational safety, accident prevention and environmental protection are complied with. All work on the device must be performed only by trained, safety instructed and authorized personnel.

2.3 General duties of the plant operator

- The plant operator is obligated to use the device only in perfect and operationally safe condition. He must ensure that, in addition to the safety notices and directions in the installation instructions, the generally accepted safety and accident prevention regulations and the provisions relating to environmental protection of the respective country of use, are heeded and complied with.
- The plant operator is responsible that all work with the device is performed only by trained, safety instructed and authorized personnel.
- The operator of the device or the personnel authorized by the operator are ultimately responsible for accident-free operation of the device, for example a contractor appointed for test operation, monitoring during operation, maintenance and repairs and removal. If the operator appoints a contractor, we recommend fixing it in writing.
- The plant operator is responsible for compliance with the technical specifications, in particular for compliance with the static loads (for explanation of terms see chapter 1.4.2 „Static load“ on page 6).
Non-compliance with the static loads may cause loss of the support or holding function. The device may shear. It will no longer support or hold the load. Personal injury and damage may result.

2.4 Requirements of the personnel

- Every person appointed to work with the device must have read and understood the complete installation instructions before starting work. This also applies, if the relevant person has previously worked with such a device or was trained to do so.
- All work on the device must be performed only by trained, safety instructed and authorized personnel. Prior to the commencement of all activities the personnel must have been made familiar with the dangers that exist while handling the device.
- All personnel may perform only work that is in accordance with their qualifications. Before starting works the area of responsibility of the personnel must be clearly defined by the operator or the supervisors authorized by the operator.
- Any personnel charged with working with the device must have no physical limitations that temporarily or permanently restrict their attentiveness or judgement (e.g. due to overtiredness).

- Minors or persons under the influence of alcohol, drugs, or medications are prohibited from working with the device and from performing any installation, dismantling and cleaning.
- Personnel must wear suitable personal protective equipment (e.g. safety glasses, safety helmet, gloves, safety footwear) appropriate for the work and the working environment.

2.5 Safety notices and directions relating to the technical condition

- The integrator must check the device for damage and to ensure that it is in good condition before installation.
- The plant operator is obligated to operate the device only in perfect and operationally safe condition. The technical condition must comply with the legal requirements in force on the date of manufacture stated on the name plate.
- If dangers to personnel or changes in operating behaviour are recognized, the device must be shut down immediately and the incident reported to your superiors or to the plant operator.
- The device may only be connected to the energy supply intended and designed for this purpose. Please refer to the name plate for the permissible voltage type and operating voltage.
- No changes, attachments or conversions may be performed on the device without the authorization of the manufacturer, elero GmbH Linearantriebstechnik (for the address see back cover).
- If wear is detected on the trapezoidal or ball screw spindle or on the spindle nut, the device must be serviced by the manufacturer.

2.6 Safety notices and directions relating to transport, assembly, installation

The relevant transport company is fundamentally responsible for the transport of the device. The following safety requirements must be complied with during transport, erection and installation of the device.

- During transport the device must be secured in accordance with the specifications of the transport equipment in use.
- For transport use only hoists and lifting gear that is adequately dimensioned for the loads.
- Only the points defined on the pallet and device are allowed to be used as lifting and hoisting points:

- If work is required on lifted parts or work devices, these must be secured against falling by means of suitable devices. Work equipment for the lifting of loads must prevent loads from shifting unintentionally, falling unhindered and unhooking unintentionally.
- Standing under suspended loads is prohibited.
- A hard hat must be worn when working with hoists for loading.
- The erection and installation work may be performed fundamentally only by trained and instructed skilled personnel.

2.7 Safety instructions relating to operation

- The operator of the device is obligated to ensure the safe and proper state of the device before the initial start of operation.
- This is also required at regular intervals during operation. The operator is responsible for implementation before starting work.
- In the event of a fault or misuse, or if control components are not connected correctly, the supporting and retaining function of the device can become impaired.
- No radial or torsional forces may be allowed to act upon the device.

2.8 Safety notices and directions relating to the electrical installation

- All work on the electrical system must only be performed by authorized persons who are qualified to work on electrical systems in accordance with the rules and regulations applicable in the country of use. Furthermore, the national statutory regulations of the respective country of use must be observed.
- In the event of any defects, such as loose connections or defective or damaged cables, the device must not be put into operation.
- In the event of faults with the electrical equipment, the device must be switched off immediately.
- The device must be switched to a de-energized state before any inspection, installation or dismantling work.
- The device must not be hosed down with a high-pressure cleaner or steam jet.

The following items must be checked before connecting the device to the power supply:

- Are all electrical connections, safety devices, fuses, etc. properly installed, connected and earthed?

Safety

- Is the power connection provided in accordance with the specifications in the electrical circuit diagram (voltage type, voltage level)?
- Has the supply line been de-energized?

3 Product description

3.1 General

The device is an electromechanical linear drive. It performs linear movements.

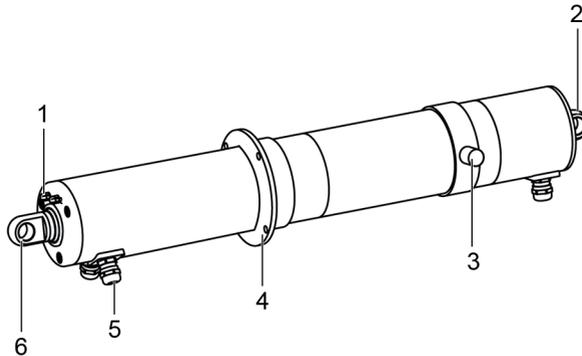


Abb. 2 Components of the device

Limit switch setting screws
Fastening on housing side
Pivot pin fastening (optional)
Flange fastening (optional)
Connection cable
Fastening on piston side

3.2 Product variants

The device can be purchased in various configurations.
See the order confirmation for the exact configuration of your device.

3.3 Technical specifications



All information in this section relates to an ambient temperature of 68 °F [20 °C].

3.3.1 Summary of the technical parameters Econom 0 and 01

Technical specifications	Econom 0	Econom 01
Rated voltage	see data plate	
Force, dynamic	723 to 21699 pdl 22.5 to 674.4 lbf [100 to 3000 N]	3616.5 to 36165 pdl 112.4 to 1124 lbf [500 to 5000 N]
Force, static	723 to 21699 pdl 22.5 to 674.4 lbf [100 to 3000 N]	3616.5 to 36165 pdl 112.4 to 1124 lbf [500 to 5000 N]
Stroke speed	approx. 0.1181 to 13.7795 ft/min approx. 0.0236 to 2.7559 inch/s [approx. 0,6 to 70 mm/s]	approx. 0.1378 to 17.7165 ft/min approx. 0.0275 to 3.5433 inch/s [approx. 0,7 to 90 mm/s]
Stroke length	up to 15.75 inch up to 1.3123 ft [up to 400 mm]	up to 29.53 inch up to 2.4606 ft [up to 750 mm]
Rated current	see data plate ¹⁾	
Power	see data plate	
Duty cycle	see data plate (for explanation see Appendix 6.1)	
Length of the control and connection cables	59.0 inch [1,50 m] ²⁾	
Protection class	see data plate (for explanation see Appendix 6.2)	
Operating temperature range	-4 °F bis +176 °F [-20 °C to +80 °C]	
Airborne noise emission	< 70 dB(A) ³⁾	
Weight	up to 26.5 lb [up to 12 kg]	up to 55.1 lb [up to 25 kg]

Tab. 1 Technical parameters Econom 0 and 01

- 1) If voltage surge protection devices are used, the exact current draw of the unit must be calculated prior to installation.
- 2) Depending on customer request, between 59 Inch [1,5 m] and 394 Inch [10,0 m].
- 3) 39.4 Inch [1 m] distance; 63 Inch [1.6 m] above unit; nominal operation; measuring tolerance 10 %

Product description



Refer to the name plate for the type-dependent values of your device.

3.3.2 Summary of the technical parameters Econom 1 and 2

Technical specifications	Econom 1	Econom 2
Rated voltage	see data plate	
Force, dynamic	6509.7 to 72330 pdl 202.3 to 2248 lbf [900 to 10.000 N]	36165 to 144660 pdl 1124 to 4496 lbf [5000 to 20.000 N]
Force, static	6509.7 to 72330 pdl 202.3 to 2248 lbf [900 to 10.000 N]	36165 to 144660 pdl 1124 to 4496 lbf [5000 to 20.000 N]
Stroke speed	approx. 0.0984 to 13.7795 ft/min approx. 0.0197 to 2.7559 inch/s [approx. 0,5 mm/s to 70 mm/s]	approx. 0.1968 to 8.8582 ft/min approx. 0.0394 to 1.7716 inch/s [approx. 1 mm/s to 45 mm/s]
Stroke length	up to 29.53 inch up to 2.4606 ft [up to 750 mm]	up to 29.53 inch up to 2.4606 ft [up to 750 mm]
Rated current	see data plate ¹⁾	
Power	see data plate	
Duty cycle	see data plate (for explanation see Appendix 6.1)	
Length of the control and connection cables	59.0 inch [1,50 m] ²⁾	
Protection class	see data plate (for explanation see Appendix 6.2)	
Operating temperature range	-4 °F to +176 °F [-20 °C to +80 °C]	
Airborne noise emission	< 70 dB(A) ³⁾	
Weight	up to 66.1 lb [up to 30 kg]	up to 77.2 lb [up to 35 kg]

Tab. 2 Technical parameters Econom 1 and 2

¹⁾ If voltage surge protection devices are used, the exact current draw of the unit must be calculated prior to installation.

²⁾ Depending on customer request, between 59 Inch [1,5 m] and 394 Inch [10,0 m].

³⁾ 39.4 Inch [1 m] distance; 63 Inch [1.6 m] above unit; nominal operation; measuring tolerance 10 %



Refer to the name plate for the type-dependent values of your device.

3.3.3 Information relating to the self-locking facility



WARNING

Danger of injury through loss of the self-locking facility.

Crushing and fatal injuries are possible.

- If self-locking is required, a device with brake must be used.



CAUTION

Possible damage to the device or customer's machine through loss of the self-locking facility.

- If self-locking is required, a device with brake must be used.

With the devices it is differentiated between dynamic and static self-locking. Dynamic self-locking arises from movement and static self-locking when the device is at a standstill. The self locking facility on the devices is dependent on various factors, e.g.:

- Flight angle of the spindle and nut
- Surface roughness of the flanks of the spindle and nut
- Running speed

The self-locking facility can be negatively influenced by a multitude of factors, e.g. by:

- Shocks and vibrations
- Loads
- Heating

A theoretically self-locking spindle is no replacement for a brake. For this reason the assumption of any warranty obligations relating to self-locking is excluded.

Self-locking is NOT for the purpose of fulfilling any safety-related properties.

To minimize further dangers, observe the normal duty of care for technical products.

4 Installation



WARNING

Danger of injury due to weathering influences.
The skin may suffer frostbite or burns.

- Personal protective equipment must be worn.
-



WARNING

Danger of injury due to incorrectly dimensioned mountings.
Crushing and fatal injuries are possible.



- Use only fastening materials that are suitable for the dimensions of the mountings.
 - The fastening points for the device in the customer's system must be at a minimum rated for the forces for which the device was designed.
-



WARNING

Danger of injury through loss of the support and holding function.
Crushing and fatal injuries are possible.



- Pay attention to static loads.
-



WARNING

Danger of injury due to electric current.
Electric shock possible.



- Electrical work must only be performed by a person who is authorized to work on the electrical system.
-



WARNING

Danger of life-threatening injury due to faulty electrical connection.
Electric shock possible.



- Before initial start of operation check that the PE conductor is correctly connected.
-



CAUTION

Damage to the device due to radial and/or torsional forces.

- No radial or torsional forces may be allowed to act upon the device.
-



CAUTION

Damage to the device due to the connecting rod jamming.

- The linear path of the piston must be freely moveable at all times.
 - The pivoting range of the device must be kept free.
-



CAUTION

Damage to the device due to loss of the support and holding function.

- Pay attention to static loads.
-



CAUTION

Damage to the device due to faulty electrical connection.

- For devices with protection type IP 65 and IP 65s, the ends of all cables or connectors must be protected against the penetration of moisture (see Appendix 6.2). This measure must be implemented immediately after removal of the device from the original packaging.
-



The device was manufactured with the circuit diagram order by the customer. See the sales documentation or the circuit diagram enclosed with the delivery for the identification.



In delivery condition (factory setting), the connecting rod is already slightly extended. Please refer to the sales documentation for the fastening dimensions in retracted and extended condition.

4.1 Mechanical fastening



CAUTION

Damage to the device due to torsional forces.

- No torsional forces may be allowed to act on the device.
-



CAUTION

Damage to the electrical leads due to crushing or a tensile load.

- All electrical leads must be laid out where they are not exposed to crushing or tensile loads.
 - The bending radii of the cables must be at least 1.97 inches [50 mm].
-

The device must be installed with the specified fastening components only (see Abb. 2 on page 18).

These are located at the end of the housing (Pos. 2) and on the piston rod (Pos. 6). Further optional elements include the flange (Pos. 4) or pivot fastening (Pos. 3).

4.1.1 Mounting positions

Protection class (see Appendix 6.2)	Place of installation	Mounting position
IP 65	Outdoor area	free
IP 65s	Outdoor area	Piston rod downwards
IP 54	Inside area	free

Tab. 3 Mounting position of the devices

4.2 Electrical connection



WARNING

Danger of life-threatening injury due to faulty electrical connection.

Electric shock possible.



- Before initial start of operation check that the PE conductor is correctly connected.
-



CAUTION

Damage to the device due to faulty electrical connection.

- Note that the motor and control system can have different connection voltages.
-



CAUTION

Damage to the device due to mishandling.

- Operation is not permitted without connecting the limit switches to the control system. The limit switches must be integrated into the controller by the integrator or a person appointed by the integrator. The integrator or a person appointed by the integrator must ensure that the signals are correctly evaluated. (Exception: see chap. 4.3.7 „Option, device without limit switches“ described devices without limit switch and devices with internal limit switches that shut off the motor directly.)
-



CAUTION

Damage to unit for versions with 400 V 3 AC caused by faulty electrical connection (see name plate at U_N).

- The sequence of terminals L1, L2, L3 of the device must conform to the power supply feed (right-hand rotary field).
-



CAUTION

Damage to the device due to the use of a non-fitting or unsuitable drive control unit.

- The control unit must support all the options attached to the device.
 - All marked cable conductors must be connected.
 - Unmarked conductors must not be connected.
-



CAUTION

Damage to the device due to faulty electrical connection.

- The motor must be shut-off by an internal limit switch actuated by an electro-mechanical relay.
-



CAUTION

Damage or destruction of the device for versions with 230 V 1 AC caused by faulty electrical connection.

- EMultiple AC drives must not be connected in parallel. This requires multipolar switches or cut-off relays.
-



CAUTION

Damage or destruction of the device through ingress of moisture in the connection cables.

- For devices with protection type IP 65 and IP 65s, the customer-provided connection of the cable ends or connectors must also have IP 65 protection (see Appendix 6.2).
-

No circuit diagrams are listed below on account of the multitude of configuration possibilities.

The device must be connected in accordance with the circuit diagram enclosed with the delivery.

Please refer to the following pages or the circuit diagram enclosed with the delivery for connection of the option selected by the customer.

4.3 Optional attachments

4.3.1 Optional brake



CAUTION

Damage to the device due to incorrect connection of the brake.

- Operate the device only with the brake released.
 - The brake must not be connected to the motor power feed.
-

The stroke movement of the connecting rod can be decelerated faster and the static self-locking can be optimized with the integrated brake.

1. Brake cable with X1 and X2

If the brake cable is labeled X1 and X2, the brake can be directly operated. See the name plate for the permissible supply voltage of the brake. If an external rectifier is required, it is supplied with the device. See the circuit diagram for connecting the external rectifier.

2. Brake cable with X1, X2, X3 and X4

If the brake cable is labeled with X1, X2, X3 and X4, the brake is operated by an internal rectifier. It is wired in the drive corresponding to the enclosed circuit diagram. See the name plate for the permissible supply voltage of the brake. It must be connected to terminals X1 and X2. The brake operates if operating voltage X1 and X2 (long reaction time) or connection X3 and X4 opens (short reaction time).

4.3.2 Bellows option



CAUTION

Damage to bellows

- Do not allow sharp edges to come into contact with the bellows.
 - Do allow the creases of the bellows to become pinched during operation.
 - Do not place bellows on moving machine components.
-

To assure permanent and trouble-free use of the bellows, the following must be observed.

In the event of very long, horizontally positioned bellows, it is recommended to suspend the bellows suitably in order to prevent any sagging and wear on the piston rod.

Make a tongue-shaped or a small hole at the bottom of a bellows crease to prevent pressure building up inside the bellows. Select the position of the hole at a point where water cannot enter.

4.3.3 Optional potentiometer



CAUTION

Damage to the device as a result of overstepping of power of the potentiometer.

- The potentiometer can be loaded to max. 0.5 W.
 - The maximum contact current is 35 mA.
 - The potentiometer may only be operated with direct current (DC).
-

The integrated potentiometer supplies information about the movement and current position of the piston rod.

The potentiometer requires a separate voltage supply.

The resistance between connections 1 and 2 increases synchronously with ejection of the piston rod.



The cable shield must be grounded by the customer.

4.3.4 Optional shaft encoder

The integrated shaft encoder supplies information about the movement of the connecting rod. Refer to the following table for the parameters necessary for operation.

Electrical parameters	
Output switching	Push-pull
Rated voltage (U_B)	5 – 24 V DC
Current consumption (no load)	max. 50 mA
Permissible load per channel	max. 50 mA
Signal level high	min. $U_B - 2.5$ V
Signal level low	max. 0.5 V
Rise time t_r	max. 1 μ s
Fall time t_f	max. 1 μ s
Short-circuit resistant outputs	Yes
CE conformity in compliance with EN 50081-2 and EN 55011 class B	

Tab. 4 Electrical parameters of the shaft encoder

Signal	0 V	+ U_B	A	\bar{A}	B	\bar{B}	0	$\bar{0}$
Conductor colour	WH	BN	GN	YE	GY	PK	BU	RD

Tab. 5 Connection assignment of the shaft encoder



All unused conductors have to be insulated before start of operation.



The cable shield must be grounded by the customer.

4.3.5 Actuator option



CAUTION

Damage to the device due to mishandling.

- The switching contacts of the actuator must be integrated in the control system.
-



CAUTION

Damage to the device by non-observance of the degree of protection.

- The device with force switch conforms to degree of protection IP 20 (see Appendix 6.2).
-

The actuator is an electromechanical switch unit.

The switching function becomes active when a specific force (in traction and compression direction) acts on the drive. However, the device does not shut down automatically. The switching contacts of the actuator must therefore be integrated in the control system.

The actuator can be supplied in the following versions:

- Actuator for traction and compression force
- Actuator for traction force
- Actuator for compression force

As all three versions are based on the same functional principle, the following description refers to the first version only.

Functional principle of the actuator:

The fastening pin is spring-supported. If a tractive or compressive force acts on the pin, it moves accordingly. The actuator is adjusted in the factory to the ordered limit values for traction or compression force (see sticker). If the force stated on the label is reached, the displacement opens a switch contact.

If the actuator is only intended for either traction or compression force, displacement of the pin in the opposite direction is prevented by a mechanical stop.

Adjustment of the limit values



CAUTION

Destruction of the device by exceeding the static load.

- The limit value changed by movement in the + direction may be above the approved static load.
-

If a readjustment of the limit values is necessary, you can extend the limit value by turning the setting screw in direction "+". Turn the setting screw in direction "-" to reduce the limit value. The two setting screws are on the cover on the housing side of the device.



To adjust the limit values, a suitable hexagon spanner is required (size 3).



Depending on the version, even minimal turning of the setting screws can result in significant changes to the limit value.

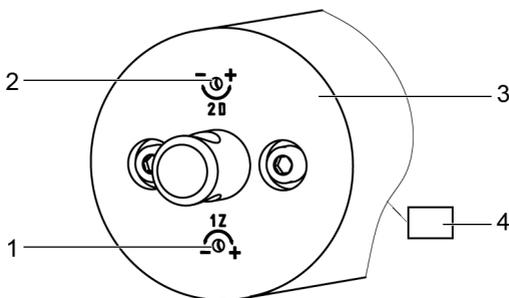


Abb. 3 Actuator

Setting screw for traction force

Setting screw for compression force

Cover on housing side

Sticker with force specification near the housing side fastener

4.3.6 Heating element option

With this option, the device contains a heating element on PTC basis. Refer to the enclosed wiring diagram for the pin assignment.

The heating element must only be connected to a voltage of 24 V DC (short-term inrush current up to 14.0 A) or 230 V AC (short-term inrush current up to 0.5 A).



See the name plate for the required voltage.

4.3.7 Option, device without limit switches

The stroke distance of the device is limited depending on the design.



CAUTION

The device may be damaged or destroyed if the permissible stroke distance is exceeded.

- Suitable measures must be taken to ensure that the approved stroke distance as specified by the dimension sheet is not exceeded.

The stroke distance of devices without limit switches must be limited by the integrator with suitable measures. The following measures are suitable for checking and limiting the stroke distance:

- installation of external limit switches or initiators
- position check by potentiometers or pulse encoders

The controller installed by the integrator must ensure that the device can only be operated in the opposite direction after it has reached the limit position.

4.3.8 Option, intermediate position switch



This option is not available for the Econom 2 device.

A device with the intermediate position switch sends out a switching signal when it runs over the set intermediate position. For setting the position see chap. 4.4.3 „Setting the optional intermediate position“.

4.4 Mechanical limit switch



To adjust the limit switch, a suitable wrench is required (size 6).

4.4.1 Permissible adjusting range of limit switches



CAUTION

The device may be damaged if the permissible adjustment range is exceeded.

- The "retracted" and "ejected" limit switches must not be adjusted any more than 0,98 Inch [25 mm] in the direction of stroke reduction.
-

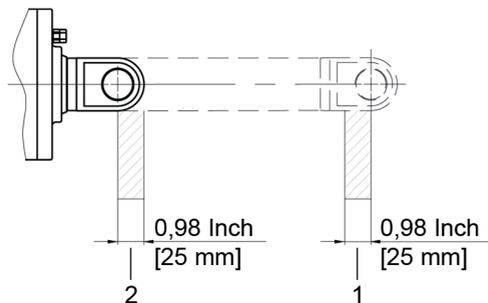


Abb. 4 Permissible stroke reduction

Stroke reduction „moved out“

Stroke reduction “moved in“

4.4.2 Adjustment of limit switches



CAUTION

The device may be damaged by incorrect adjustment of the limit switches.

- The piston rod must be moved at least 0.79 inch [20 mm] from the position that is to be set before adjusting the limit switch.
-

Factory setting:

The limit switches have been preset to the dimensions defined in the order confirmation.

If any other dimensions are required, proceed as described above:

1. Move the piston rod at least 0.79 inch [20 mm] away from the targeted limit switch position.
2. Adjust the limit switch (+/-).
3. Move the drive back to the limit switch.
4. Repeat the process until the desired dimension is reached.



The two limit switch setting screws are located on the cover of the piston side of the device.

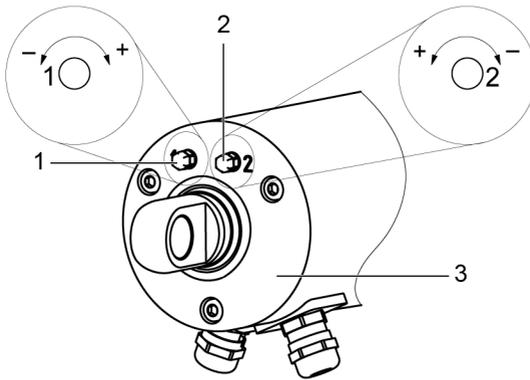


Abb. 5 Lid with setting screws

Setting screw 1 (limit position "piston ejected")
 Setting screw 2 (limit position "piston retracted")
 Cover on piston side

Adjustment of limit switch "ejected" (setting screw 1)

Stroke reduction:	Turn in direction of "-" MINUS	Limit switch position is moved in direction of "retracted". (Piston rod ejects less notably)
Stroke reduction:	Turn in direction of "+" PLUS	Limit switch position is moved in direction of "ejected". (Piston rod ejects further)

Tab. 6 Adjust setting screw 1

Adjustment of limit switch "retracted" (setting screw 2)

Stroke reduction:	Turn in direction of "-" MINUS	Limit switch position is moved in direction of "ejected". (Piston rod retracts less notably)
Stroke reduction:	Turn in direction of "+" PLUS	Limit switch position is moved in direction of "retracted". (Piston rod retracts further)

Tab. 7 Adjust setting screw 2

4.4.3 Setting the optional intermediate position

Setting screw 3 (intermediate position) is on the cover on the piston side of the device (see Abb. 6).

The optional intermediate position is set in the same manner as the position of the limit switches (see chap. 4.4.2 „Adjustment of limit switches“).

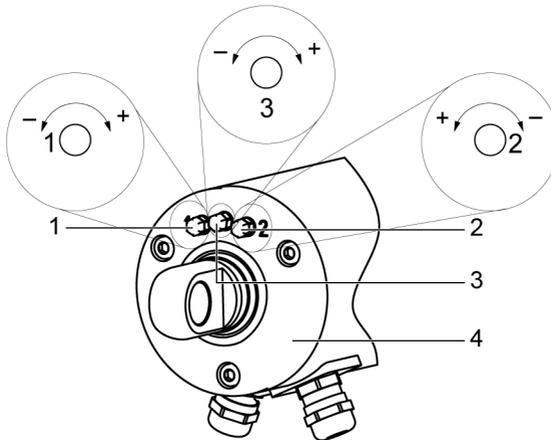


Abb. 6 Cover with setting screw 3 (intermediate position)

- Setting screw 1 (limit position „piston ejected“)
- Setting screw 2 (limit position „piston retracted“)
- Setting screw 3 (intermediate position)
- Cover on piston side

The intermediate position must not be changed more than ± 0.98 inch [± 25 mm] from the factory-set position. See the sales documentation for the factory-set intermediate position.

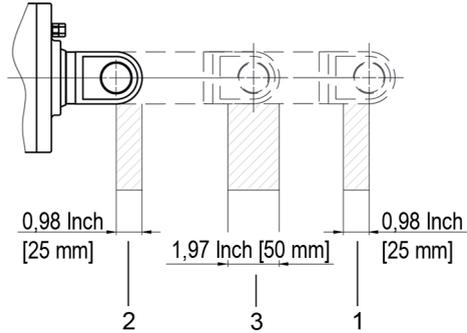


Abb. 7 Permissible setting range of intermediate position

Stroke reduction „moved out“

Stroke reduction “moved in“

Setting range of intermediate position (optional)

4.4.4 Operation of unit



CAUTION

Damage to the device due to wrong operation.

- The thermal protection switch must not be used as a regular overload switching device.
- Fast polarity reversal of the traversing direction of the device is not permissible.
- The device must come to a complete standstill before changing the direction of movement.

4.5 Dimensions sheet

On account of the multitude of configuration possibilities no dimensions sheets are listed below.

You can request from the manufacturer, elero GmbH Linearantriebstechnik (for the address see back cover), an exact dimensions sheet for the device supplied, if required.

5 Waste disposal

5.1 Scrapping

When the device is scrapped, the international, national and regional laws and regulations valid at that time must be observed.



Ensure that the recycling capability, dismantling capability and separation capability of the materials and subassemblies as well as the environmental and health dangers are all taken into consideration for the recycling and waste disposal.

Material groups, such as plastics and metals of different types, must be sorted before submitting to the recycling and waste disposal process.

5.2 Disposal of waste electrical and electronic components

Disposal and recycling of electrical and electronic components must be carried out in accordance with the relevant laws and national directives.

6 Appendix

6.1 Explanation of DC (duty cycle)

DC (duty cycle) as specified by the name plate	Operating and stop times
S1	Continuous operation
S3 15%	1,5 min on/8,5 min off

Tab. 8 Duty cycle



S3 means a percentage short-term operation based on 10 min. The percentage is the operation time.

6.2 Device protection types as per DIN EN 60529 and NEMA

NEMA protection type Type number	DIN EN 60529 protection type Classification
1	IP 10
1	IP 20
2	IP 11
3	IP 54
3 R	IP 14
3 S	IP 54
4 and 4 X	IP 65
5	IP 52
6 and 6 P	IP 67
12 and 12 K	IP 52
13	IP 54

Tab. 9 Device protection types as per DIN EN 60529 and NEMA

6.3 Conversion factors

European unit	American unit	Conversion factor	Sample calculation
mm	inch	25,4	2.3 inch x 25,4 = 58,42 mm
m	inch	0,0254	2.3 inch x 0,0254 = 0,05842 m
N	pdl	0,14	2.3 pdl x 0,14 = 0,32 N
N	lbf	4,45	2.3 lbf x 4,45 = 10,23 N
mm/s	ft/min	5,08	2.3 ft/min x 5,08 = 11,68 mm/s
mm/s	inch/s	25.4	2.3 inch/s x 25.4 = 58,42 mm/s
kg	lbs	0,453	2.3 lbs x 0,453 = 1,04 kg
°C	°F	°F = °C x 1,8 + 32	2.3 °F x 1,8 +32 = 36,14 °C

Tab. 10 Conversion factors

elero GmbH
Linearantriebstechnik

Naßäckerstraße 11
07381 Pöbneck
Deutschland

T +49 3647 46 07-0

F +49 3647 46 07-42

info@elero-linear.de

www.elero-linear.com