



Linear Actuator RA 60 K

Version with limit switch or stroke measuring system



1 Description of the product

Linear actuators RA 60 K consist of a direct current drive (voltage see technical characteristics), whose drive energy is transferred over a planetary gear and a spindle lifting gear to the pushing rod.

The generated lifting force is available as push and pull force.

Linear actuators without stroke measuring systems are equipped with internal limit switches. These avoid unintended overrun and overload of the mechanical stop positions.

The end positions of linear actuators with stroke measuring system are definable by the signal of the stroke measuring system.

The sturdy design with code class IP69K guarantees a trouble-free function also in rough operating conditions.

Linear actuators are maintenance free and can be operated with a duty cycle of up to 15%.

Version with limit switches

The version with limit switches has 2 integrated sensors, which automatically switch off the motor as soon as the upper or lower stroke end position is obtained. This guarantees that the linear actuator does not mechanically push against the stop.

Version with stroke measuring system

The version with absolute stroke measuring system is equipped with a linear potentiometer. A slider at the pushing rod produces a signal at the potentiometer, that is proportional to the position of the pushing rod. This signal can easily be evaluated by a priority control and is permanently available. Referencing is not required. Due to the direct connection of the absolute stroke measuring system to the pushing rod, one gets a precise stroke information with slight backlash. This linear actuator is equipped with a potentiometer and a subsequent amplifier that generates a standardised output signal independent of the stroke length. With the stroke measuring system, control-oriented applications and the compound of several linear actuators in synchronism can be realised.

2 Validity of the documentation

This operating manual is valid for linear actuators of the following types:

RA 60 K – 12 V DC

Part no.: F2-XX-XX-1-C-AS3A (with stroke end disconnection)

Part no.: F2-XX-XX-1-C-AS3A (with stroke measuring system)

3 Target group of this document

- Experts for installation and maintenance with electro-mechanical know-how.

Qualification of the personnel

Expert knowledge means that the personnel must

- be in the position to read and completely understand technical specifications such as circuit diagrams and product-specific drawing documents,

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- have expert knowledge (electric, hydraulic, pneumatic knowledge, etc.) of function and design of the corresponding components.

An **expert** is somebody who has due to its professional education and experiences sufficient knowledge and is familiar with the relevant regulations so that he

- can judge the entrusted works,
- can recognize the possible dangers,
- can take the required measures to eliminate dangers,
- knows the acknowledged standards, rules and guidelines of the technology.
- has the required knowledge for repair and mounting.

4 Symbols and signal words

⚠ WARNING

Person damage

Stands for a possibly dangerous situation.

If it is not avoided, death or very severe injuries will result.

CAUTION

Easy injuries / property damage

Stands for a possibly dangerous situation.

If it is not avoided, minor injuries or material damages will result.



Hazardous to the environment

The symbol stands for important information for the proper handling with materials that are hazardous to the environment.

Ignoring these notes can lead to heavy damages to the environment.

Note

This symbol stands for tips for users or especially useful information. This is no signal word for a dangerous or harmful situation.

5 For your safety

5.1 Basic information

The operating instructions serve for information and avoidance of dangers when installing the products into the machine as well as information and references for transport, storage and maintenance.

Only in strict compliance with these operating instructions, accidents and property damages can be avoided as well as trouble-free operation of the products can be guaranteed.

Furthermore, the consideration of the operating instructions will:

- avoid injuries
- reduce down times and repair costs,
- increase the service life of the products.

5.2 Safety instructions

The product was manufactured in accordance with the generally accepted rules of the technology.

Observe the safety instructions and the operating instructions given in this manual, in order to avoid personal damage or material damage.

- Read these operating instructions thoroughly and completely, before you work with the product.
- Keep these operating instructions so that they are accessible to all users at any time.

- Pay attention to the current safety regulations, regulations for accident prevention and environmental protection of the country in which the product will be used.
- Use the ROEMHELD product only in perfect technical condition.
- Observe all notes on the product.
- Use only accessories and spare parts approved by the manufacturer in order to exclude danger to persons because of not suited spare parts.
- Respect the intended use.
- You only may start up the product, when it has been found that the incomplete machine or machine, in which the product shall be mounted, corresponds to the country-specific provisions, safety regulations and standards.
- Perform a risk analysis for the incomplete machine, or the machine.

Due to the interactions between the product and the machine/fixture or the environment, risks may arise that only can be determined and minimized by the user, e.g. :

- generated forces,
- generated movements,
- Influence of hydraulic and electrical control,
- etc.

6 Application

6.1 Intended use

The product was exclusively designed as an actuating element, that is not relevant for safety, for the application in the mobile automotive engineering, conveyor and dosing technology, communal technology as well as agricultural and forest technology.

The product is provided for fixation as per figure 1.

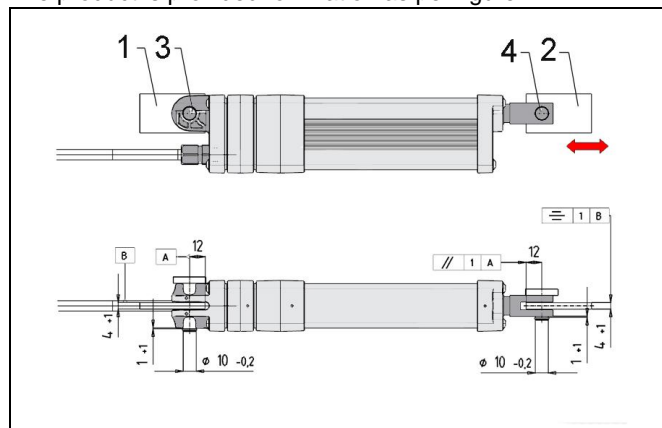


Figure 1: Mounting

- | | | | |
|---|------------------------------------------------------------------------------------------------------|---|----------------------------------------|
| 1 | User's fixed construction | 3 | User's fixing bolt with safety element |
| 2 | User's construction, parallel to the centre line, protected against torsion and axially displaceable | 4 | User's fixing bolt with safety element |

Furthermore the following belongs to possible uses:

- Use within the performance data indicated in the chapter "Technical characteristics".
- The product must only be exposed to push or pull loads.
- Use as per operating instructions.
- Mounting as described in figure 1.

NOTE

Durability and environment tests.

The product is designed for the use in outdoor applications and is correspondingly resistant to corrosion.

- Before using this product the user has to check the usability of the product for its application by own durability and environment tests.

6.2 Misapplication

WARNING

Injuries, material damages or malfunctions!

- The product must never be opened. At the product no changes must be made, except the ones expressly mentioned in the operating instructions!

The use of the products is not authorised:

- For domestic use.
- For use at fairgrounds and amusement parks.
- In food processing or in areas with special hygiene regulations.
- In mines.
- In ATEX areas (in explosive and aggressive environments, e.g. explosive gases and dusts).
- If physical effects (welding currents, vibrations or others) or chemically acting media damage the seals (resistance of the seal material) or components and this can lead to functional failure or premature failure.

Special solutions are available on request!

7 Installation

7.1 Design

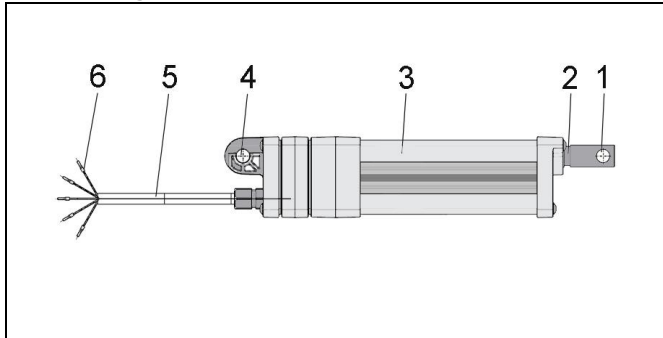


Figure 2: Components

1 Fork head, at the front	4 Fork head, at the rear
2 Pushing rod	5 Cable
3 Housing	6 Cable wires isolated with wire bushes

7.2 Circuit diagrams

7.2.1 Version with limit switches

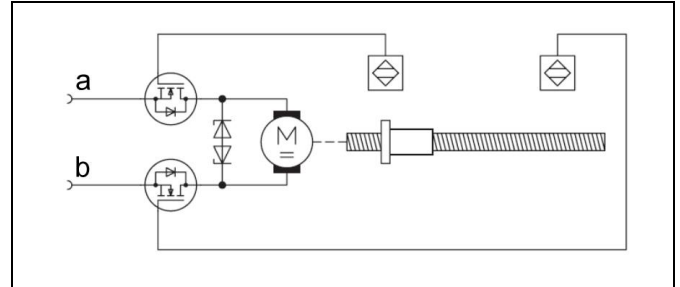


Figure 3: for RA 60 K with limit switch

a white + (extend) - (retract)	b brown - (extend) + (retract)
Remaining cable ends not connected!	

Note

RA 60 K with limit switches cannot be operated in synchronism.

7.2.2 Version with stroke measuring system

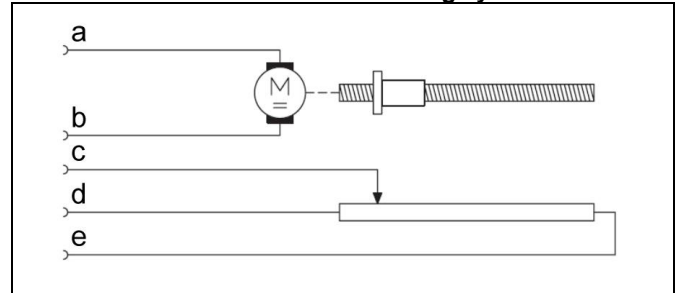


Figure 4: for RA 60 K with stroke measuring system

a white + (extend) - (retract)	c yellow Poti output
b brown - (extend) + (retract)	d grey Poti ground
	e Poti reference +

Note

The version with (absolute) stroke measuring system is equipped with a linear potentiometer.

This is evaluated according to the potentiometer principle (voltage divider).

For this purpose port d is connected to the reference potential (0 V) and port e to the constant reference voltage.

At port c only a voltage can be tapped that is proportional to the position of the pushing rod.

Thus, in retracted mode of the pushing rod a voltage can be measured near the reference potential and in extended mode near the reference voltage.

Generally the voltage at port c is connected to an analogous input of the priority control, where it is evaluated.

The input resistance of the analogous input must be >1M ohm to avoid any influences on the linearity of the absolute stroke measuring system.

7.3 Mounting - installation

⚠ WARNING

Injury / burning due to contact with energized parts!

- Before working on electric equipment, the energized parts must be de-energized and secured.
- Do not open protection covers at electric parts.
- All electrical works must only be realised by electricians.

⚠ CAUTION

Injury by rotating parts!

The product does not have an anti-torsion device. The extending pushing rod and mounting parts can rotate.

- Operate the product only in installed condition.

Side loads and forced conditions on the product lead to the premature failure.

- If required, provide external guides.
- Avoid forced conditions (overdetermination) of the product.
- Max. forces and torques see technical characteristics.

Fixing the connecting cable

Connection cable can be damaged.

- The cables must be fixed by the user so that no bending and tensile stress will act and the cable cannot be damaged in any way.

Component damage caused by faulty control

Use control of data sheet M 8.200.

If user's control is provided, this control must be equipped with the following functions:

- switching off in case of over-current as protection against blockade, collision, etc.
- current limitation as protection against damages,
- switching off in case of short circuits as protection against overheating and fire, etc. and
- recognition of defect displacement transducer as protection against damages, etc.

Do not approach the mechanical stops

It has to be guaranteed by the user's control that the element will not be moved to the internal mechanical end positions.

1. Disconnect user's control from the voltage network.
2. Prepare the user's construction to mount the product. Pay attention to sufficient freedom of motion.
3. Connect the product with the fork head at the front and at the rear by means of the user's fixing bolts to the user's construction.
4. Secure the fixing bolts with convenient components of the user.

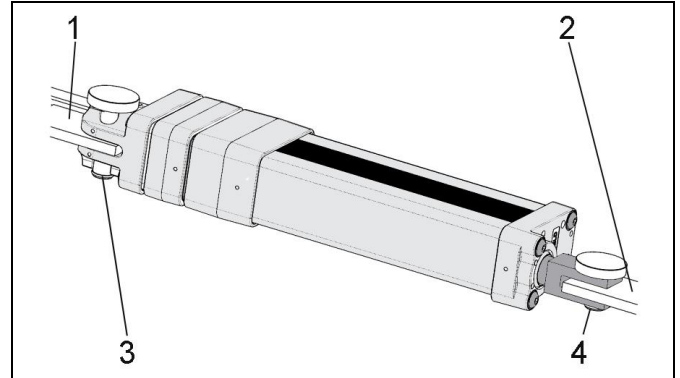


Figure 5: Installation of the product

- | | |
|--------------------------------------------------------------------------------------------------------|------------------------------------------|
| 1 User's fixed construction | 3 User's fixing bolt with safety element |
| 2 User's construction, parallel to the centre line, protected against torsion and axially displaceable | 4 User's fixing bolt with safety element |

5. Place and fix the cable.
6. Connect all cable wires to the terminal strip, as per circuit diagram of the product and user's terminal connection plan, of the user's control.
7. Connect user's control to the voltage network.

Note

We recommend to install the cable ends or plug-type connectors protected against the environmental conditions to avoid penetration of humidity and premature corrosion.

8 Start up

Before putting into operation the product, an installation inspection has to be made.

⚠ WARNING

Injury by crushing!

Components of the product make a movement while they are in operation, this can cause injuries.

- Keep parts of the body and items out of the working area!

⚠ CAUTION

Performance of the product!

The admissible performance data of the product, see chapter "Technical characteristics", may not be exceeded.

The installation control includes the following:

- No side loads may act on the product.
- No torques may act on the product.
- The product must be connected to the user's construction with both fork heads by means of a secured fixing bolt.
- The product must be completely connected to the user's control as per the corresponding circuit diagram and the user's terminal diagram.

If the above requirements are not met, the product must not be put into operation.

8.1 Operation

WARNING

Injury by crushing!

Components of the product make a movement while they are in operation, this can cause injuries.

- Keep parts of the body and items out of the working area!

CAUTION

Performance of the product!

The admissible performance data of the product, see chapter "Technical characteristics", may not be exceeded.

Component damage caused by faulty control

Use control of data sheet M 8.200.

If user's control is provided, this control must be equipped with the following functions:

- switching off in case of over-current as protection against blockade, collision, etc.
- current limitation as protection against damages,
- switching off in case of short circuits as protection against overheating and fire, etc. and
- recognition of defect displacement transducer as protection against damages, etc.

Do not approach the mechanical stops

It has to be guaranteed by the user's control that the element will not be moved to the internal mechanical end positions.

The product must only be operated with a suitable control.

9 Maintenance

The product is maintenance free within the indicated service life.

9.1 Cleaning / disinfection

CAUTION

Do not clean the product in operation

In accordance with code class IP69K the product is provided for the cleaning with high-pressure cleaners.

- This code class is not guaranteed during retracting and extending.
- Do not clean the product in operating mode.
- A minimum distance of 30 cm between the nozzle of the high-pressure cleaner and the product is to be kept.

Material damage, damage or functional failure

Aggressive cleaning agents can cause damage, especially to seals.

The product must not be cleaned with:

- corrosive or caustic substances or
- organic, solvents such as halogenated or aromatic hydrocarbons and ketones (cellulose thinner, acetone, etc.).

9.2 Service life

The service life is designed for 20,000 cycles (extending/retracting).

10 Trouble shooting

WARNING

Injuries, material damages or malfunctions!

- The product must never be opened. At the product no changes must be made, except the ones expressly mentioned in the operating instructions!

Trouble	Cause	Remedy
Pushing rod does not extend or retract after control	No supply voltage	Check and restore supply voltage
	User's construction too stiff	Check and restore smooth running
	Actuating range of the user's construction is jammed by an item or dirt	Remove item, dirt
	Cable break	Immediately put the product out of operation and send it to Römheld GmbH
	Motor, gear or spindle nut defect	Immediately put the product out of operation and send it to Römheld GmbH
strongly-reduced speed	User's construction too stiff	Check and restore smooth running
	Motor, gear or spindle nut defect	Immediately put the product out of operation and send it to Römheld GmbH
	Supply voltage too low	Check and increase supply voltage, if required
Stroke end disconnection does not function (only F2-XX-XX-X-C-ES3A)	Limit switch defect	Immediately put the product out of operation and send it to Römheld GmbH
Measuring signal stroke measuring system incorrect (only F2-XX-XX-X-C-AS3A)	Cable damaged	Immediately put the product out of operation and send it to Römheld GmbH
	Potentiometer defect	Immediately put the product out of operation and send it to Römheld GmbH

10.1 Repair

WARNING

Injuries, material damages or malfunctions!

- The product must never be opened. At the product no changes must be made, except the ones expressly mentioned in the operating instructions!

NOTE

Repair of electrical components

- Repair works, as e.g. the change of electric components may only be effected by the service technicians of the company Römheld.

11 Technical characteristics

Max. pull / push force F2-03-XX-1-C-XS3A F2-06-XX-1-C-XS3A	[N]	300 600
Speed at max. pull / push force (at 13.8 V and 20°C) F2-03-XX-1-C-XS3A F2-06-XX-1-C-XS3A	[mm/s]	20 +- 20% 9 +- 20%
Speed at idle running (at 13.8 V and 20°C) F2-03-XX-1-C-XS3A F2-06-XX-1-C-XS3A	[mm/s]	30 +- 20% 16 +- 20%
Stroke F2-XX-10-1-C-XS3A F2-XX-15-1-C-XS3A	[mm]	100 +3 -2 150 +3 -2
Nominal supply voltage	[V]	12
Adm. supply voltage	[V]	10...16,6
Max. residual ripple	[%]	10
Max. current consumption at max. pull/push force	[A]	3,5
Max. input power	[W]	50
Max. adm. duty cycle	[]	15 %, 1.5 min ON
Protection class as per VDE 0100-40		III
Code class		IP 69 K
Admissible mounting position		any
Adm. environment conditions (storage and operation)	[°C]	-20 ...+70
Adm. cleaning temperature	[°C]	70 for 5 min
Adm. relative humidity	[%]	30...90 not condensing
Adm. environmental pressure	[hPa]	700...1060

Only for type with stroke measuring system (F2-XX-XX-1-C-AS3A)		
Connecting resistance	[kΩ]	5
Linearity	[%]	+ - 1
Load at 40°C	[W]	0.5
Max. supply voltage for WMS at connection e	[V]	50

NOTE

In the case of a current consumption exceeding 5 A the user's control must switch off the product after 10 sec. at the latest.

NOTE

Specifications

- For further technical data see installation drawing of the product.

12 Accessory

WARNING

Injury / burning due to contact with energized parts!

- Before working on electric equipment, the energized parts must be de-energized and secured.
- Do not open protection covers at electric parts.
- All electrical works must only be realised by electricians.

To connect the cable, the kit of plug-type connectors AMP Superseal 5 Pol (part-no. 3823-088) consisting of plug and socket with seals can be used.

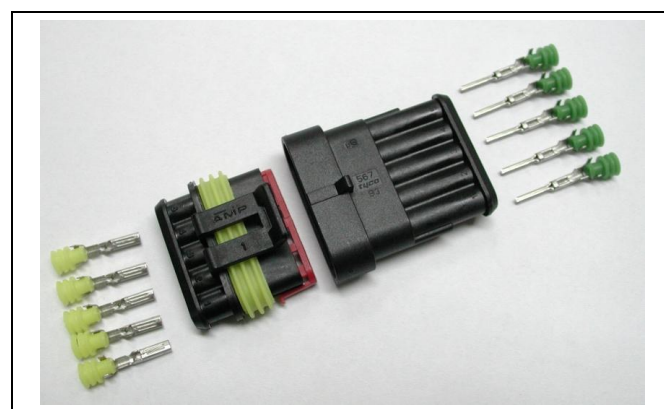


Figure 6: Kit of plug-type connectors AMP Superseal 5 Pol

Professional mounting of plugs and sockets should be made according to the specifications of the manufacturer Typco Electronics for the plug-type connector kits.

13 Disposal



Hazardous to the environment

Due to possible environmental pollution, the individual components must be disposed only by an authorised expert company.

The individual materials have to be disposed as per the existing regulations and directives as well as the environmental conditions.

For the disposal of electrical and electronic components (e.g. stroke measuring systems, proximity switches, etc.) country-specific legal regulations and specifications have to be kept.

14 Declaration of conformity



Manufacturer

Römheld GmbH Friedrichshütte
Römheldstraße 1-5
35321 Laubach, Germany
Tel.: +49 (0) 64 05 / 89-0
Fax: +49 (0) 64 05 / 89-211
E-mail: info@roemheld.de
www.roemheld.com

Responsible person for the documentation:

Dipl.-Ing. (FH) Jürgen Niesner, Tel.: +49(0)6405 89-0.

This declaration of conformity applies to the following products:

This operating manual is valid for linear actuators of the following types:

RA 60 K – 12 V DC

Part no.: F2-XX-XX-1-C-AS3A (with stroke end disconnection)

Part no.: F2-XX-XX-1-C-AS3A (with stroke measuring system)

The following additional EU directives were applied:

- **2006/42/EC**, Machinery directive [www.eur-lex.europa.eu]

2014/30/EU EMC - Electromagnetic compatibility [www.eur-lex.europa.eu]

- **2011/65/EU**, RoHS

The following harmonised standards have been applied:

DIN EN ISO 12100, 2011-03, Safety of machinery; Basic concepts, General principles for design (replacement for part 1 and 2)

DIN EN 60204-1; 2007-06, Safety of machinery - Electrical equipment of machines, Part 1: General requirements

The technical documents according to the specified guidelines were created for the products.

The manufacturer obligates to provide the special documentation of the products to national authorities on demand.

If the product is modified and not approved by us, this declaration will become invalid.



Ewgeni Schleining
Development Team Leader MH

Römheld GmbH
Friedrichshütte

Laubach, 14.05.2024