



Linear actuators RA 600 industrial

Max. lifting force 1,000 to 6,000 N, stroke from 100 to 600 mm. Version with limit switches or stroke measuring system



1 Description of the product

Linear actuators RA 600 consist of a 24 VDC direct current drive (voltage see technical characteristics), whose drive energy is transferred over a worm gear and a spindle lifting gear to the pushing rod.

The self-locking spindle lifting gear stops the actuator in case of power failure and maintains it safely in the reached position. Features of the sturdy design are the generous dimensioning of the actuator and the solid design of the housing.

Linear actuators RA600 are protected against corrosion and function without any troubles also in rough operating and environmental conditions.

Since they are maintenance-free, this is permanently guaranteed.

Features of the sturdy design are the generous dimensioning of the actuator and the solid design of the housing.

As an alternative to the code class IP66 also a press and splash water protection as per code class IP69K is available.

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 stroke measuring system allows the realisation of control-oriented applications and the operation of several linear actuators in synchronism.

The stroke ends are freely definable by means of the digital signal.

Version with self-locking

All linear actuators are designed with a self-locking mechanism. For higher safety in the case of a break an internal lock nut can be provided.

This is possible as special solution on request.

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2 Validity of the documentation

Linear actuators RA 600 of the data sheet L 1.101.
The following types or part numbers are concerned:

ID. I6-XX-XX-2-X-ESA

K _____

01 = 1.000 N
02 = 2.000 N
04 = 4.000 N
06 = 6.000 N

H _____

10 = 100 mm
15 = 150 mm
20 = 200 mm
30 = 300 mm
40 = 400 mm
50 = 500 mm
60 = 600 mm

P _____

B = IP66
C = IP69K

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B = IP66
C = IP69K

ID Code for part no.	H Stroke
K Max. lifting force (push force)	P Code class

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,
- 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 Safety instructions

DANGER

Danger of life / heavy health damages

Stands for an imminent danger.

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

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.



Mandatory sign!

The symbol stands for important information, necessary protection equipment, etc.

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

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!

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.

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

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.

Performance of the product!

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

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.

Attachment of the connecting cable

- The cable must be fixed by the user so that no bending and tensile stresses will act on the cable and that the cable cannot be damaged.

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.

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.

Aggressive cleaning agents

The product must not be cleaned with:

- Corrosive or corroding components or
- Organic solvents as halogen or aromatic hydrocarbons and ketones (cellulose thinner, acetone, etc.), because this can destroy the seals.

6 Application

6.1 Intended use

The electric linear actuator may be used for linear stroke movement only.

It may only be centrally loaded with the maximum forces indicated in the technical characteristics.

The electric linear actuator may be used in applications, where a loss of the retention force can endanger the safety of the user, with a safety nut only.

The decision whether the user is endangered must be taken by the manufacturer of the application.

Every other use is not admissible.

Customer's modifications of the electric linear actuator are not permitted.

The electric linear actuators must only be used within the environmental conditions indicated below the technical characteristics.

Note

Other demands on the use, service life and load have to be agreed with the manufacturer.

The electric linear actuators have two fork eyes with \varnothing 12 mm for the connection of the user's construction.

The connecting construction has to be designed so that no forced conditions act on the pushing rod.

The electrical connection is made by coded plug-type connectors.

Note

Design and dimensions of the connecting construction see chapters Mounting and Installation!

The electric linear actuator must be installed protected against torsion. The pushing rod must be installed without any side loads.

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 these products is not admitted:

- For domestic use.
- On pallets or machine tool tables in primary shaping and metal forming machine tools.
- If due to vibrations or other physical / chemical effects damages of the products or seals can be caused.
- On pallets or machine tool tables that are used to change the characteristics of the material (magnetise, radiation, photochemical procedures, etc.).
- In areas for which special guidelines apply, especially installations and machines:
 - For the use on fun fairs and in leisure parks.
 - In food processing or special hygiene regulations.
 - For military purposes.
 - In mines.
 - In explosive and aggressive environments (e.g. ATEX).
 - In the aerospace industry.
 - For passenger transport.

Special solutions are available on request!

Non-system components or not authorised installations must not be connected to the electric linear actuators.

The adjusting system must not be used in explosive atmosphere or in explosive mixtures of anaesthesia means with oxygen or laughing gas.

7 Installation

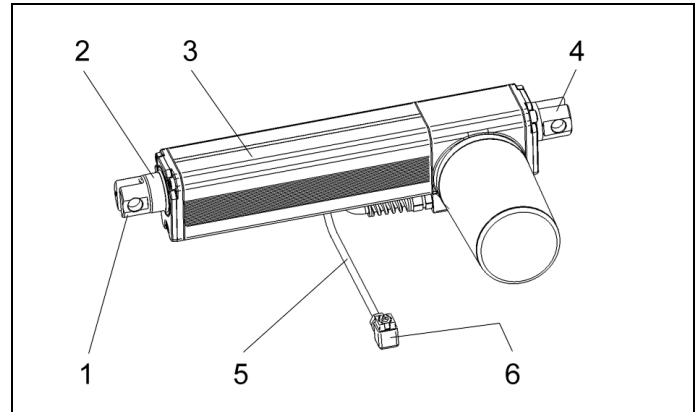


Figure 1: Components

1 Fork head, at the front	4 Fork head, at the rear
2 Pushing rod	5 Cable
3 Housing	6 Plug

7.1 Circuit diagrams

7.1.1 Version with limit switches

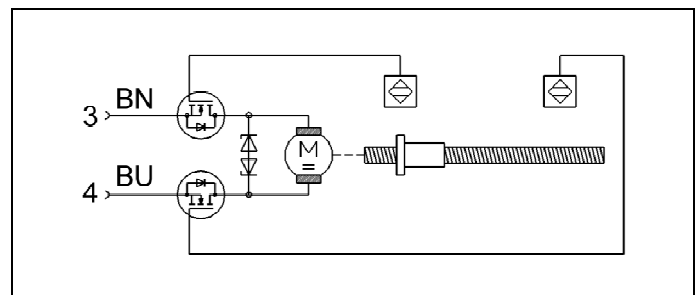


Figure 2: Circuit diagram and connection for limit switches

3 brown + (extend) - (retract)	4 blue - (extend) + (retract)
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Remaining plug contacts not connected!

Note

Only RA 600 with incremental stroke measuring system can be operated in synchronism!

If the supply unit (see accessories) is not used, the user has to provide a current limitation of 10 A.

RA 600 with limit switches cannot be operated in synchronism.

7.1.2 Version with stroke measuring system

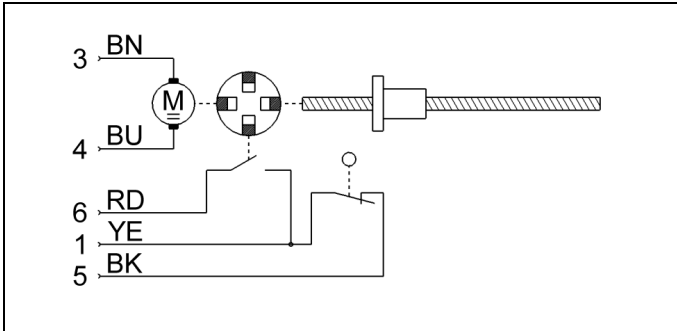


Figure 3: Circuit diagram and connection for stroke measuring system

1 (yellow) COM	4 (brown)
3 (brown)	- (extend)
+ (extend)	+ (retract)
- (retract)	5 (black) limit switch
	6 (red) pulse generator

Note

The stroke end positions must not be loaded mechanically. An approach in creep speed or switching off 3 mm before reaching the end positions is required. For supply units with synchronization control this is met by the programmed soft stop function. The positioning accuracy with touch control amounts to ± 2 mm, depending on the operator and the load. Place tasks with higher demands on the positioning accuracy can be realised with special controls. Therewith place accuracies can be realised within the size range of the resolution of the stroke measuring system.

7.1.3 Connection of plug-type connector

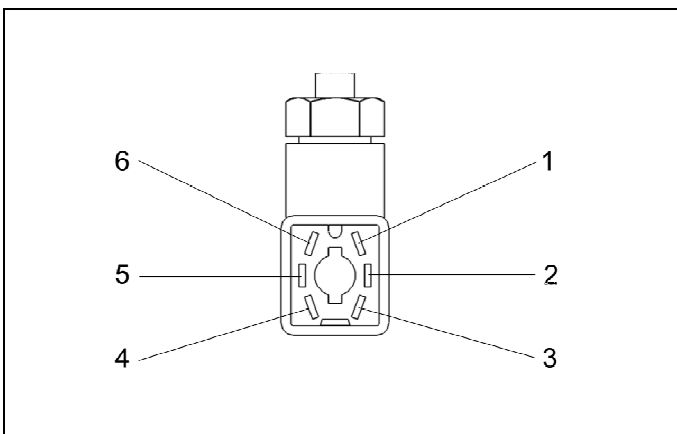


Figure 4: Connection of plug-type connector

Connection see circuit diagrams
Remaining plug contacts not connected!

7.2 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.

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

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.

Attachment of the connecting cable

- The cable must be fixed by the user so that no bending and tensile stresses will act on the cable and that the cable cannot be damaged.

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.

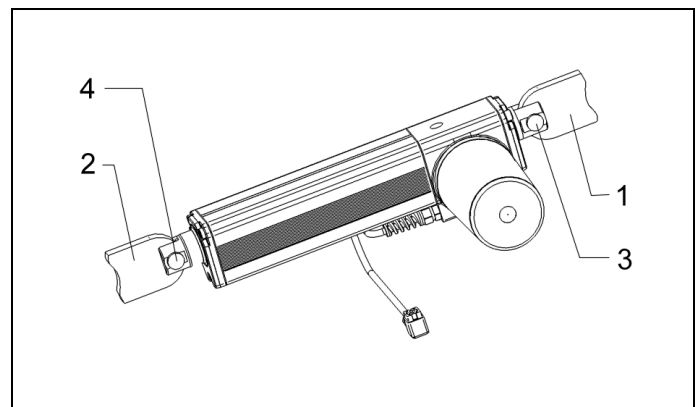


Figure 5: Installation of the product

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

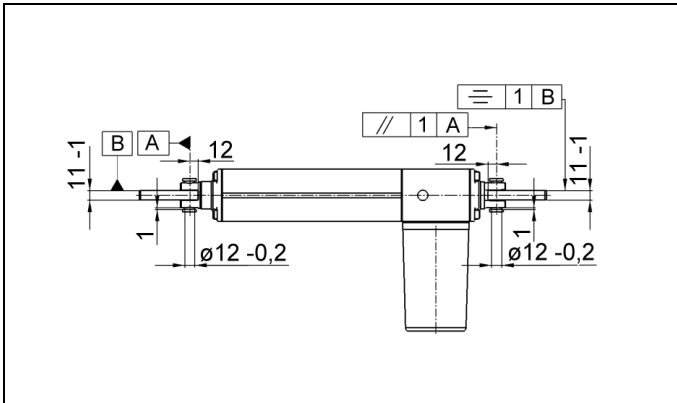


Figure 6: Design and dimensions of the connecting construction

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.
5. Place and fix the cable.
6. Insert the plug-type connectors into the control.
7. Connect user's control to the voltage network.

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.

9 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:

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- 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.

Linear actuators RA 600 can optionally be operated by hand panel or foot switch and supply units of the accessory program with touch control or by an external control with 24 V output.

The version with stroke measuring system delivers the user incremental signals of the stroke measuring system.

10 Maintenance

The product is maintenance free within the indicated service life.

10.1 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.

Aggressive cleaning agents

The product must not be cleaned with:

- Corrosive or corroding components or
- Organic solvents as halogen or aromatic hydrocarbons and ketones (cellulose thinner, acetone, etc.), because this can destroy the seals.

10.2 Service life

The service life is:

250 operating hours (only time required for stroke) for the units 2 kN and 4 kN with duty cycle 15%, 1.5 min ON

60 operating hours (only time required for stroke) for the units 6 kN with duty cycle 15%, 1.5 min ON

11 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
Strongly-reduced speed	Motor, gear or spindle nut defect	Immediately put the product out of operation and send it to Römheld GmbH
	User's construction too stiff	Check and restore smooth running
	Supply voltage too low	Check and increase supply voltage, if required
Stroke end disconnection does not function	Limit switch defect	Immediately put the product out of operation and send it to Römheld GmbH
Measuring signal stroke measuring system incorrect	Cable damaged	Immediately put the product out of operation and send it to Römheld GmbH
	Pulse generator defect	Immediately put the product out of operation and send it to Römheld GmbH

12 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.

13 Technical characteristics

Max. lifting force	[N]
I6-01-XX-2-X-ES1A	1,000
I6-02-XX-2-X-ES1A	2,000
I6-04-XX-2-X-ES1A	4,000
I6-06-XX-2-X-ES1A	6,000

The max. pulling force corresponds to 80 % of the lifting force.

Force [N]	Speed		Current consumption $\pm 20\%$, at 20°C [Ampere]	Max. duty cycle [max. 1.5 min.]
	Idle running [mm/s]	On load [mm/s]		
1,000	37.0	29.0	6.0	15 %
2,000	21.0	18.0	5.0	
4,000	11.0	7.0	5.5	
6,000	8.5	5.0	7.0	

Stroke [mm]	Stroke [mm]	Weight [kg]
I6-XX-10-2-X-ES1A	100	3.2
I6-XX-15-2-X-ES1A	150	3.6
I6-XX-20-2-X-ES1A	200	4.0
I6-XX-30-2-X-ES1A	300	4.5
I6-XX-40-2-X-ES1A	400	5.0
I6-XX-50-2-X-ES1A	500	5.7
I6-XX-60-2-X-ES1A	600	6.4

Nominal supply voltage	[V DC]	24
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

Protection class as per VDE 0100-40	III
Code class: I6-XX-XX-2-B-ES1A I6-XX-XX-2-C-ES1A	IP 66 IP 69 K

Resolution of the stroke measuring system

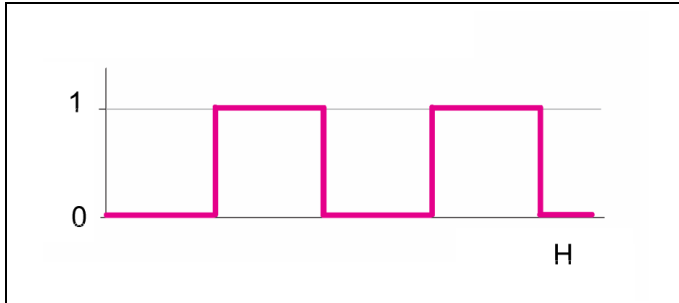


Figure 7: Diagram: Resolution of the stroke measuring system

1 Edge to edge distance	H Stroke [mm]
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Max. lifting force [N]	Resolution
1,000	0.75 mm stroke = 1 edge to edge distance
2,000	0.75 mm stroke = 1 edge to edge distance
4,000	0.5 mm stroke = 1 edge to edge distance
6,000	0.375 mm stroke = 1 edge to edge distance

Note

Further information

- For further technical data see ROEMHELD data sheet.

14 Accessory

Mechanical accessories

Bearing sleeve for fork eyes, DU bushing Ø12 / Ø10
Part-no. 3301-936

Electrical accessories

See data sheet M 8.200

Foot switch

for touch control up - down, with connecting cable 3.0 m
Part-no. 3823-038

Hand panel

for touch control up - down, with connecting cable 1.6 m
Part-no. 3823-025

Supply unit

with control for one linear actuator
Part-no. 3821-246

Supply unit

with synchronization control
for 2 linear actuators
Part-no. 3821-400

Mains cable 230 VAC

with earthing type plug for supply units, mains cable smooth, 3.0 m
Part-no. 3823-040

Plug

for user's control with 5 soldered strands and blade receptacles
Part-no. 3823-048

15 Disposal

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.

DANGER



Hazardous to the environment

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

16 Declaration of manufacture

16.1 Manufacturer

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

16.2 Validity of the documentation

Linear actuators RA 600 of the data sheet L 1.101.
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P _____

B = IP66
C = IP69K

ID Code for part no.	H Stroke
K Max. lifting force (push force)	P Code class

16.3 Declaration of manufacture

The listed products are designed and manufactured in line with the relevant versions of the EC directives **2006/95/EC - Low voltage directive** and in compliance with the valid technical rules and standards.

In accordance with **2006/42/EC** (EC MSRL) and E 982 these products are components that are not ready for use and are exclusively designed for the installation into an incomplete machine / machine.

The products may only be put into operation after it was assessed that the incomplete machine / machine, in which the product shall be installed, corresponds to the machinery directives (2006/42/EC).

The manufacturer commits to transmit the special documents of the products to state authorities on request.

The technical documentation as per appendix IV was prepared for the products.

16.4 List of the applied standards

2006/42/EC Machinery Directive

2004/108/EC EMC - Electromagnetic compatibility

2002/95/EC, Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

DIN EN 349, 2008-09, Safety of machinery. Minimum gaps to avoid crushing of parts of the human body

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

DIN EN ISO 12100-2, 2004-04, Safety of machinery - Basic concepts, General principles for design - Part 2: Technical principles

DIN EN ISO 14121-1, 2007-12, Safety of machinery- Risk assessment- Part 1: Principles

DIN EN 60529; 2000-09, Degrees of protection provided by enclosures (IP- Codes)

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

DIN EN 60309; 2007-11, VDE 0623-1:2007-11, Plugs, socket-outlets and couplers for industrial purposes – Part 1: General requirements

DIN EN 61000-6-2; 2006-03, Electromagnetic compatibility (EMC) - Generic standards - Immunity for industrial environment

DIN EN 61000-6-4; 2007-09, Electromagnetic compatibility (EMC) - Generic standards - Immunity for industrial environment

Responsible person for the documentation:

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Friedrichshütte

Laubach, 07.10.2013