USER MANUAL

TECHLINE®
IMPROVING FLEXIBILITY

ACTUATOR LA36

To learn more about LINAK, please visit:
www.linak.com

LINAK®
WE IMPROVE YOUR LIFE

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Preface

Dear User,

We are delighted that you have chosen a product from LINAK®.
LINAK systems are high-tech products based on many years of experience in the manufacture and development of actuators, electric control boxes, controls, and chargers.

This user manual does not address the end-user, but is intended as a source of information for the manufacturer of the equipment or system only, and it will tell you how to install, use and maintain your LINAK electronics. It is the responsibility of the manufacturer of the end-use product to provide a User Manual where relevant safety information from this manual is passed on to the end-user.

We are sure that your LINAK product/system will give you many years of problem-free operation. Before our products leave the factory they undergo full function and quality testing. Should you nevertheless experience problems with your LINAK product/system, you are always welcome to contact your local dealer. LINAK subsidiaries and some distributors situated all over the world have authorised service centres, which are always ready to help you.

LINAK provides a warranty on all its products. This warranty, however, is subject to correct use in accordance with the specifications, maintenance being done correctly and any repairs being carried out at a service centre, which is authorised to repair LINAK products.
Changes in installation and use of LINAK products/systems can affect their operation and durability. The products are not to be opened by unauthorised personnel.

The User Manual has been written based on our present technical knowledge. We are constantly working on updating the information and we therefore reserve the right to carry out technical modifications.

LINAK A/S

LINAK application policy

The purpose of the application policy is to define areas of responsibilities in relation to applying a LINAK product defined as hardware, software, technical advice, etc. related to an existing or a new customer application.

LINAK products as defined above are applicable for a wide range of applications within Medical, Furniture, Desk, and Industry areas. Yet, LINAK cannot know all the conditions under which LINAK products will be installed, used, and operated, as each individual application is unique.

The suitability and functionality of the LINAK product and its performance under varying conditions (application, vibration, load, humidity, temperature, frequency, etc.) can only be verified by testing, and shall ultimately be the responsibility of the LINAK customer using any LINAK product.

LINAK shall be responsible solely that LINAK products comply with the specifications set out by LINAK and it shall be the responsibility of the LINAK customer to ensure that the specific LINAK product can be used for the application in question.

Chapter 1

Safety instructions

Please read this safety information carefully:

Be aware of the following three symbols throughout the user manual:

Warning!
Failing to follow these instructions can cause accidents resulting in serious personal injury.

Recommendations
Failing to follow these instructions can result in the actuator suffering damage or being ruined.

Additional information
Usage tips or additional information that is important in connection with the use of the actuator.

Furthermore, ensure that all staff who are to connect, mount, or use the actuator are in possession of the necessary information and that they have access to this user manual.

Persons who do not have the necessary experience or knowledge of the product/products must not use the product/products. Besides, persons with reduced physical or mental abilities must not use the product/products, unless they are under surveillance or they have been thoroughly instructed in the use of the apparatus by a person who is responsible for the safety of these persons.

Moreover, children must be under surveillance to ensure that they do not play with the product.

Before you start mounting/dismounting, ensure that the following points are observed:

- The actuator is not in operation.
- The actuator is free from loads that could be released during this work.

Before you put the actuator into operation, check the following:

- The actuator is correctly mounted as indicated in the relevant user instructions.
- The equipment can be freely moved over the actuator's whole working area.
- The actuator is connected to a mains electricity supply/transformer with the correct voltage and which is dimensioned and adapted to the actuator in question.
- Ensure that the voltage applied matches to the voltage specified on the actuator label.
- Ensure that the connection bolts can withstand the wear.
- Ensure that the connection bolts are secured safely.

During operation, please be aware of the following:

- Listen for unusual sounds and watch out for uneven running. Stop the actuator immediately if anything unusual is observed.
- Do not sideload the actuator.
- Only use the actuator within the specified working limits.
- Do not step or kick on the actuator.

When the equipment is not in use:

- Switch off the mains supply in order to prevent unintentional operation.
- Check regularly for extraordinary wear.

Classification

The equipment is not suitable for use in the presence of a flammable anaesthetic mixture with air or with oxygen or nitrous oxide.

Warnings

- Do not sideload the actuator.
- When mounting the LA36 in the application ensure that the bolts can withstand the wear and that they are secured safely.
- If irregularities are observed, the actuator must be replaced.

Recommendations

- Do not place load on the actuator housing and do prevent impact or blows, or any other form of stress to the housing.
- Ensure that the cable cover is mounted correctly. Use 1.5Nm torque.
- Ensure that the duty cycle and the usage temperatures for LA36 actuators are respected.
- Ensure that the cable cannot be squeezed, pulled or subjected to any other stress.
- Furthermore, it will be good practice to ensure that the actuator is fully retracted in the "normal" position. The reason is that there will be a vacuum inside the actuator if it is extended which over time can lead to water entering the actuator.
- If the actuator (without integrated controller) is mounted in an application where a mechanical stop prevents the endstop switches in the actuator from being activated, the actuator must be equipped with an electrical safety device (current monitoring) or external limit switch.

Chapter 2

Mounting guidelines

LINAK® linear actuators are quickly and easily mounted by slipping pins through the holes on each end of the units and into brackets on the machine frame and the load.

The mounting pins must be parallel to each other as shown in Figure 1. Pins, which are not parallel to each other, may cause the actuator to bend and be damaged.

The load should act along the stroke axis of the actuator since off centre loads may cause bending and lead to premature failure. See Figure 2.

Make sure the mounting pins are supported in both ends. Failure to do so could shorten the life of the actuator. Also, avoid applying a skew load on the actuator.

The actuator can rotate around the pivot point in the front and rear end. If this is the case it is of high importance that the actuator is able to move freely over the full stroke length, both during the development and during daily operation. Please pay special attention to the area around the housing where parts can be trapped and cause damages to the application and actuator.

In applications with high dynamic forces LINAK recommends not to use the fully extended or retracted position over longer time, as this can damage the endstop system permanently.

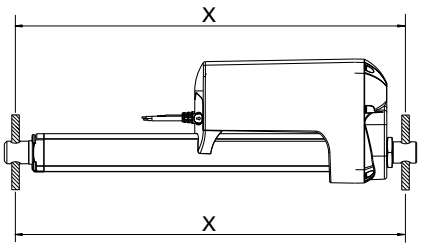


Figure 1

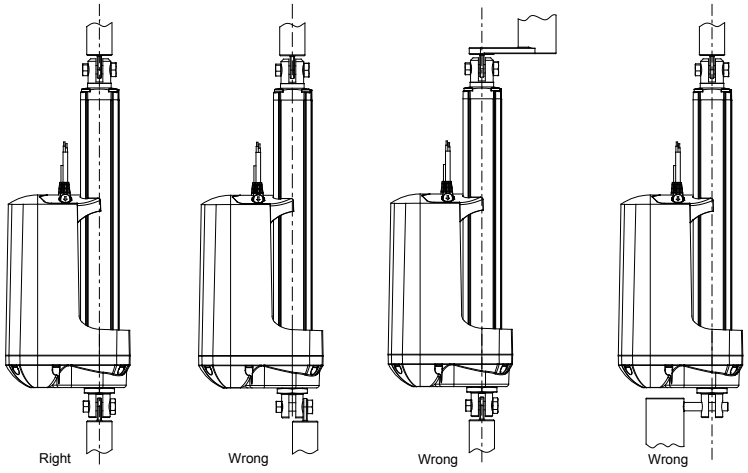


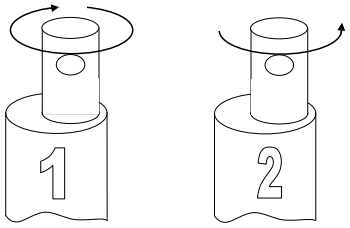
Figure 2

Mounting guidelines

- The mounting pins must have the correct dimension
- The bolts and nuts must be made of a high quality steel grade (e.g. 10.8). No thread on the bolt inside the back fixture or the piston rod eye
- Bolts and nuts must be protected so there is no risk for them to fall out
- Do not use a torque that is too high when mounting the bolts for the back fixture or he piston rod eye. This will stress the fixtures

Please note:
The piston rod eye is only allowed to turn 0-90 degrees.

Instruction concerning the turning of the piston rod eye:
When mounting and taking into use, it is not permitted to make excessive turns of the piston rod eye. In cases where the eye is not positioned correctly, it is permitted to first screw the eye down to its bottom position, at a maximum torque of 2Nm (1), and thereafter a maximum 90 degrees turn outwards again (2).

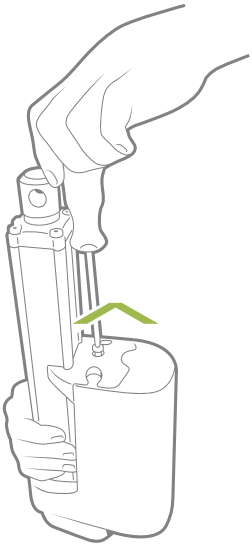


Warning!
If the actuator is used for pull in an application where personal injury can occur, the following is valid:
It is the application manufacturer's responsibility to incorporate a suitable safety arrangement, which will prevent personal injury from occurring, if the actuator should fail

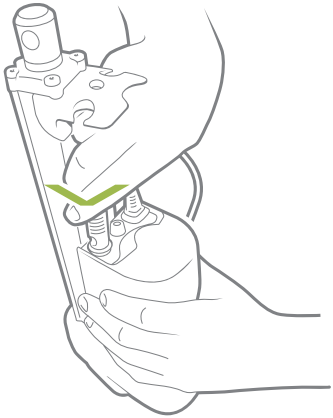
Warning!
LINAK's actuators are not designed for use within the following fields:

- Offshore installations
- Aeroplanes and other aircraft
- Nuclear power generation

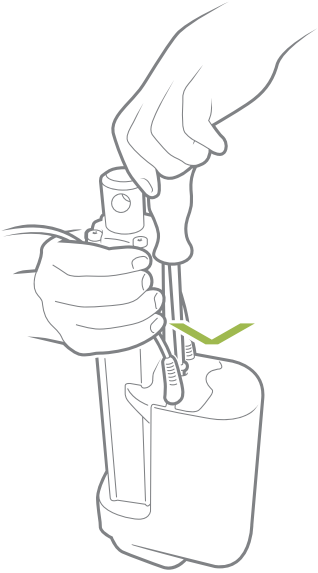
Mounting of cables



1. Unscrew the cover and remove the two blind plugs.



2. Plug in the power cable and/or the signal cable.



3. Slide the cover onto the actuator.

   The torque of the cover screw is approx. 1.5 ± 0.3 Nm

   TORX 25IP

When changing the cables on a LINAK actuator, it is important that this is done carefully, in order to protect the plugs and pins. Before the new cable is mounted, we recommend that the socket is greased with vaseline, to keep the high IP protection and ensure an easy mounting. Please be sure that the plug is in the right location and fully pressed in before the cable lid is mounted.

Please note that if the cables are mounted and dismounted more than 3 times the plugs can be damaged. Therefore, we recommend that such cables are discarded and replaced.

We recommend to take some precaution and design the wire connection in a way, where the cable end is kept inside a closed, protected area to guarantee the high IP protection.

Electrical installation

- To ensure maximum self-locking ability, please be sure that the motor is shorted when stopped.
  Actuators with integrated controller have this feature incorporated.
- When using soft stop on a DC-motor, a short peak of higher voltage will be sent back towards the power supply. It is important when selecting the power supply that it does not turn off the output, when this backwards load dump occurs.

The power supply for actuators without integrated controller must be monitored externally and cut off in case of overload.

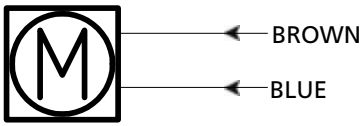
Recommended fuse for actuators without integrated controller

Type	Spindle Pitch (mm)	Thrust max. Push/Pull (N)	Typical Amp. at full load (A)			Recommended fuse		
			36V	24V	12V	36V	24V	12V
36080xxxxxxAxxxxH...	8	10000	-	-	22.0	-	-	44.0
36120xxxxxxAxxxxF...	12	2600	-	-	21.0	-	-	42.0
36120xxxxxxAxxxxG...	12	4500	-	-	20.7	-	-	41.4
36120xxxxxxAxxxxH...	12	6800	-	-	21.0	-	-	42.0
36200xxxxxxAxxxxF...	20	1700	-	-	22.0	-	-	44.0
36200xxxxxxAxxxxE...	20	500	-	-	20.0	-	-	40.0
36080xxxxxxBxxxxH...	8	1000	-	10.4	-	-	20.8	-
36120xxxxxxBxxxxF...	12	2600	-	10.4	-	-	20.8	-
36120xxxxxxBxxxxG...	12	4500	-	10.2	-	-	20.4	-
36120xxxxxxBxxxxH...	12	6800	-	10.3	-	-	20.6	-
36200xxxxxxBxxxxF...	20	1700	-	10.3	-	-	20.6	-
36200xxxxxxBxxxxE...	20	500	-	10.0	-	-	20.0	-
36080xxxxxxCxxxxH...	8	10000	8.0	-	-	16.0	-	-
36120xxxxxxCxxxxF...	12	2600	8.0	-	-	16.0	-	-
36120xxxxxxCxxxxG...	12	4500	8.0	-	-	16.0	-	-
36120xxxxxxCxxxxH...	12	6800	8.0	-	-	16.0	-	-
36200xxxxxxCxxxxF...	20	1700	8.0	-	-	16.0	-	-
36200xxxxxxCxxxxE...	20	500	8.0	-	-	16.0	-	-

Actuator without feedback

Connection diagram:

Fig. 1 : 36xxxxx00/10xxxxxx
36xxxxxxx000xx-xxxxxxxxxxxxxxx



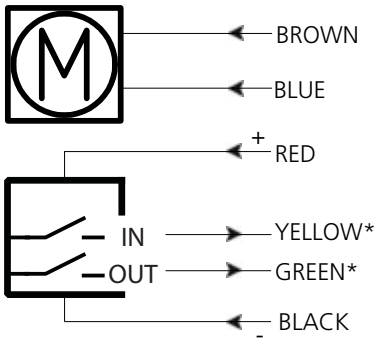
I/O specifications:

Input/Output	Specification	Comments
Description	Permanent magnetic DC motor. See connection diagram, fig. 1 above	
Brown	12, 24 or 36VDC (+/-) 12V ± 20% 24V ± 10% 36V ± 10%	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue	Under normal conditions: 12V, max. 26A depending on load 24V, max. 13A depending on load 36V, max. 10A depending on load	To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
Red	Not to be connected	
Black	Not to be connected	
Green	Not to be connected	
Yellow	Not to be connected	
Violet	Not to be connected	
White	Not to be connected	

Actuator with endstop signal output

Connection diagram:

Fig. 2 : 36xxxxx20xxxxxx
36xxxxxxx000xx-xxxxxxxxxxxxxxx



*YELLOW/GREEN:
Endstop signals out are NOT potential free!

If you wish to use the endstop signals, you will have to keep power on the brown, blue, red and black wires, otherwise the signal will be lost.

Actuator with endstop signal output

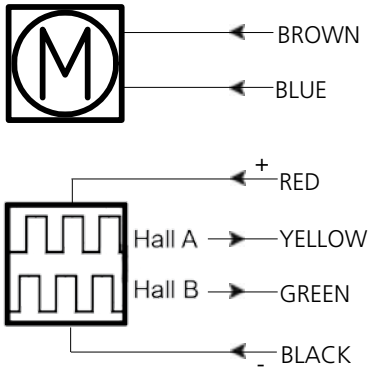
I/O specifications:

Input/Output	Specification	Comments
Description	The actuator can be equipped with electronically controlled endstop signals out. See connection diagram, fig. 2 on page 14	
Brown	12, 24 or 36VDC (+/-) 12V ± 20% 24V ± 10% 36V ± 10%	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue	Under normal conditions: 12V, max. 26A depending on load 24V, max. 13A depending on load 36V, max. 10A depending on load	To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
Red	Signal power supply (+) 12-24VDC	Current consumption: Max. 40mA, also when the actuator is not running
Black	Signal power supply GND (-)	
Green	Endstop signal out	Output voltage min. V_{IN} - 2V Source current max. 100mA NOT potential free
Yellow	Endstop signal in	
Violet	Not to be connected	
White	Not to be connected	

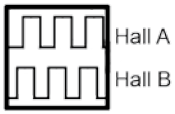
Actuator with relative positioning - Dual Hall

Connection diagram:

Fig. 3 : 36xxxxx0H/1Hxxxxxx
36xxxxxxxH00xx-xxxxxxxxxxxxxxx



Actuator with relative positioning - Dual Hall
I/O specifications:

<table>
<tr><th>Input/Output</th><th colspan="2">Specification</th><th>Comments</th></tr>
<tr><td>Description</td><td colspan="2">The actuator can be equipped with Dual Hall that gives a relative positioning feedback signal when the actuator moves.
See connection diagram, fig. 3, page 16</td><td> 
</td></tr>
<tr><td>Brown</td><td colspan="2" rowspan="2">12, 24 or 36VDC (+/-)
12V ± 20%
24V ± 10%
36V ± 10%

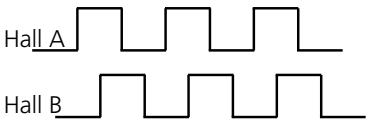
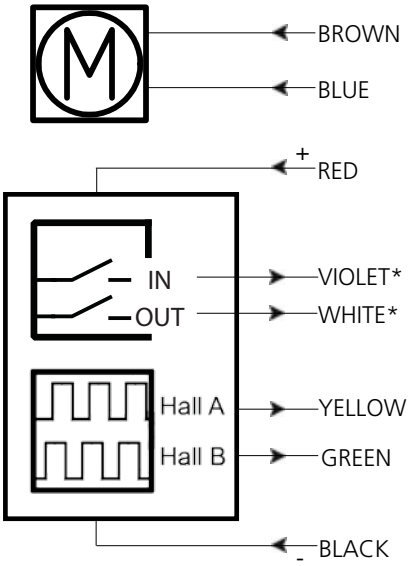
Under normal conditions:
12V, max. 26A depending on load
24V, max. 13A depending on load
36V, max. 10A depending on load</td><td>To extend actuator:
Connect Brown to positive
To retract actuator:
Connect Brown to negative</td></tr>
<tr><td>Blue</td><td>To extend actuator:
Connect Blue to negative
To retract actuator:
Connect Blue to positive</td></tr>
<tr><td>Red</td><td colspan="2">Signal power supply (+)
12-24VDC</td><td rowspan="2">Current consumption:
Max. 40mA, also when the actuator is not running</td></tr>
<tr><td>Black</td><td colspan="2">Signal power supply GND (-)</td></tr>
<tr><td>Green</td><td>Hall B</td><td rowspan="2">Movement per single hall pulse:
LA362C Actuator = 0.4 mm per pulse
LA363C Actuator = 0.7 mm per pulse
LA363B Actuator = 1.0 mm per pulse
LA363A Actuator = 1.7 mm per pulse
LA365A Actuator = 2.9 mm per pulse</td><td rowspan="2">The Hall sensor signals are generated by the turning of the actuator gearing. These signals can be fed into a PLC (Programmable Logic Controller). In the PLC the quadrature signals can be used to register the direction and position of the piston rod.
Output voltage min. V_{IN} - 1V
Current output 12mA
Overvoltage on the motor can result in shorter pulses.
N.B. For more precise measurements, please contact LINAK A/S.</td></tr>
<tr><td>Yellow</td><td>Hall A</td></tr>
<tr><td>Violet</td><td colspan="3">Not to be connected</td></tr>
<tr><td>White</td><td colspan="3">Not to be connected</td></tr>
<tr><td>Diagram of Dual Hall:</td><td colspan="3"> 

Fig. 3.1</td></tr>
</table>

Actuator with endstop signals and relative positioning - Dual Hall

Connection diagram:

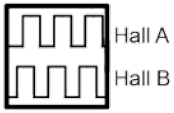
Fig. 4 : 36xxxxx2Hxxxxxx
36xxxxxxxH00xx-xxxxxxxxxxxxxxx



*VIOLET/WHITE:
Endstop signals out are NOT potential free!

If you wish to use the endstop signals, you will have to keep power on the brown, blue, red and black wires, otherwise the signal will be lost.

Actuator with endstop signals and relative positioning - Dual Hall I/O specifications:

<table>
<tr><th>Input/Output</th><th colspan="2">Specification</th><th>Comments</th></tr>
<tr><td>Description</td><td colspan="2">The actuator can be equipped with Dual Hall that gives a relative positioning feedback signal when the actuator moves.
See connection diagram, fig. 4, page 18</td><td> 
</td></tr>
<tr><td>Brown</td><td colspan="2" rowspan="2">12, 24 or 36VDC (+/-)
12V ± 20%
24V ± 10%
36V ± 10%

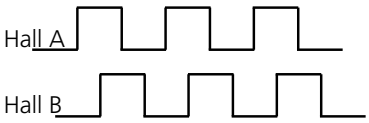
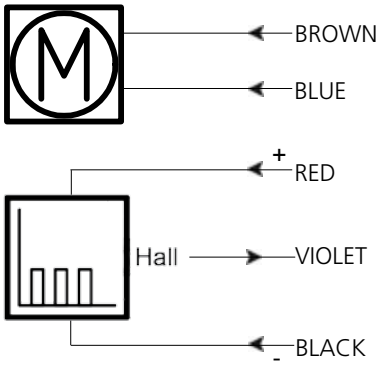
Under normal conditions:
12V, max. 26A depending on load
24V, max. 13A depending on load
36V, max. 10A depending on load</td><td>To extend actuator:
Connect Brown to positive
To retract actuator:
Connect Brown to negative</td></tr>
<tr><td>Blue</td><td>To extend actuator:
Connect Blue to negative
To retract actuator:
Connect Blue to positive</td></tr>
<tr><td>Red</td><td colspan="2">Signal power supply (+)
12-24VDC</td><td rowspan="2">Current consumption:
Max. 40mA, also when the actuator is not running</td></tr>
<tr><td>Black</td><td colspan="2">Signal power supply GND (-)</td></tr>
<tr><td>Green</td><td>Hall B</td><td rowspan="2">Movement per single hall pulse:
LA362C Actuator = 0.4 mm per pulse
LA363C Actuator = 0.7 mm per pulse
LA363B Actuator = 1.0 mm per pulse
LA363A Actuator = 1.7 mm per pulse
LA365A Actuator = 2.9 mm per pulse</td><td rowspan="2">The Hall sensor signals are generated by the turning of the actuator gearing. These signals can be fed into a PLC (Programmable Logic Controller). In the PLC the quadrature signals can be used to register the direction and position of the piston rod.
Output voltage min. V_{IN} - 1V
Current output 12mA
Overvoltage on the motor can result in shorter pulses.
N.B. For more precise measurements, please contact LINAK A/S.</td></tr>
<tr><td>Yellow</td><td>Hall A</td></tr>
<tr><td>Violet</td><td colspan="2">Endstop signal in</td><td rowspan="2">Output voltage min. V_{IN} - 2V
Source current max. 30mA
NOT potential free</td></tr>
<tr><td>White</td><td colspan="2">Endstop signal out</td></tr>
<tr><td>Diagram of Dual Hall:</td><td colspan="3"> 

Fig. 4.1</td></tr>
</table>

Actuator with relative positioning - Single Hall

Connection diagram:

Fig. 5 : 36xxxxx0K/1Kxxxxxx
36xxxxxxxK00xx-xxxxxxxxxxxxxxx



Actuator with relative positioning - Single Hall
I/O specifications:

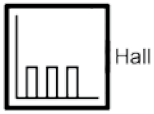
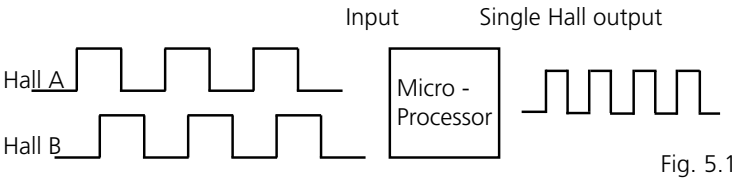
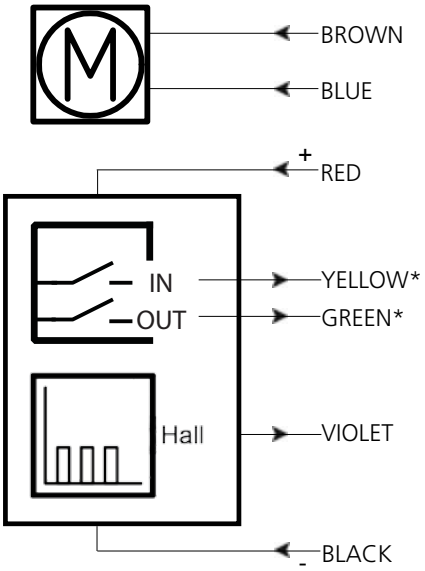
<table>
<tr><th>Input/Output</th><th>Specification</th><th>Comments</th></tr>
<tr><td>Description</td><td>The actuator can be equipped with Single Hall that gives a relative positioning feedback signal when the actuator moves.
See connection diagram, fig. 5, page 20</td><td> 
</td></tr>
<tr><td>Brown</td><td>12, 24 or 36VDC (+/-)
12V ± 20%
24V ± 10%
36V ± 10%</td><td>To extend actuator:
Connect Brown to positive
To retract actuator:
Connect Brown to negative</td></tr>
<tr><td>Blue</td><td>Under normal conditions:
12V, max. 26A depending on load
24V, max. 13A depending on load
36V, max. 10A depending on load</td><td>To extend actuator:
Connect Blue to negative
To retract actuator:
Connect Blue to positive</td></tr>
<tr><td>Red</td><td>Signal power supply (+)
12-24VDC</td><td rowspan="2">Current consumption:
Max. 40mA, also when the actuator is not running</td></tr>
<tr><td>Black</td><td>Signal power supply GND (-)</td></tr>
<tr><td>Green</td><td colspan="2">Not to be connected</td></tr>
<tr><td>Yellow</td><td colspan="2">Not to be connected</td></tr>
<tr><td rowspan="2">Violet</td><td>Single Hall output (PNP)
Movement per Single Hall pulse:
LA362C: Actuator = 0.1 mm per count
LA363C: Actuator = 0.2 mm per count
LA363B: Actuator = 0.3 mm per count
LA363A: Actuator = 0.4 mm per count
LA365A: Actuator = 0.7 mm per count
Frequency:
Frequency is 30-125 Hz on Single Hall output depending on load and spindle. Overvoltage on the motor can result in shorter pulses.</td><td>Output voltage min. V_{IN} - 2V
Max. current output: 12mA
Max. 680nF
N.B. For more precise measurements, please contact LINAK A/S.
Low frequency with a high load.
Higher frequency with no load.</td></tr>
<tr><td colspan="2">Diagram of Single Hall:
 

Fig. 5.1</td></tr>
<tr><td>White</td><td colspan="2">Not to be connected</td></tr>
</table>

Actuator with endstop signals and relative positioning - Single Hall

Connection diagram:

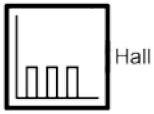
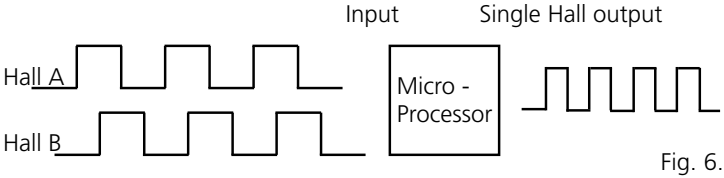
Fig. 6 : 36xxxxx2Kxxxxxx
36xxxxxxxK00xx-xxxxxxxxxxxxxxx



*YELLOW/GREEN:
Endstop signals out are NOT potential free!

If you wish to use the endstop signals, you will have to keep power on the brown, blue, red and black wires, otherwise the signal will be lost.

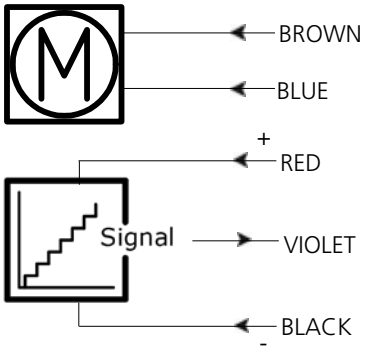
Actuator with endstop signals and relative positioning - Single Hall I/O specifications:

Input/Output	Specification	Comments
Description	The actuator can be equipped with Single Hall that gives a relative positioning feedback signal when the actuator moves. See connection diagram, fig. 6, page 22	
Brown	12, 24 or 36VDC (+/-) 12V ± 20% 24V ± 10% 36V ± 10%	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue	Under normal conditions: 12V, max. 26A depending on load 24V, max. 13A depending on load 36V, max. 10A depending on load	To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
Red	Signal power supply (+) 12-24VDC	Current consumption: Max. 40mA, also when the actuator is not running
Black	Signal power supply GND (-)	
Green	Endstop signal out	Output voltage min. V_{IN} - 2V Source current max. 100mA NOT potential free
Yellow	Endstop signal in	
Violet	Single Hall output (PNP) Movement per Single Hall pulse: LA362C: Actuator = 0.1 mm per count LA363C: Actuator = 0.2 mm per count LA363B: Actuator = 0.3 mm per count LA363A: Actuator = 0.4 mm per count LA365A: Actuator = 0.7 mm per count Frequency: Frequency is 30-125 Hz on Single Hall output depending on load and spindle. Overvoltage on the motor can result in shorter pulses.	Output voltage min. V_{IN} - 2V Max. current output: 12mA Max. 680nF N.B. For more precise measurements, please contact LINAK A/S. Low frequency with a high load. Higher frequency with no load.
	Diagram of Single Hall:  Fig. 6.1	
White	Not to be connected	

Actuator with absolute positioning - Analogue feedback

Connection diagram:

Fig. 7 : 36xxxxx1B/1Cxxxxxx
36xxxxxxxB00xx-xxxxxxxxxxxxxxx
36xxxxxxxC00xx-xxxxxxxxxxxxxxx



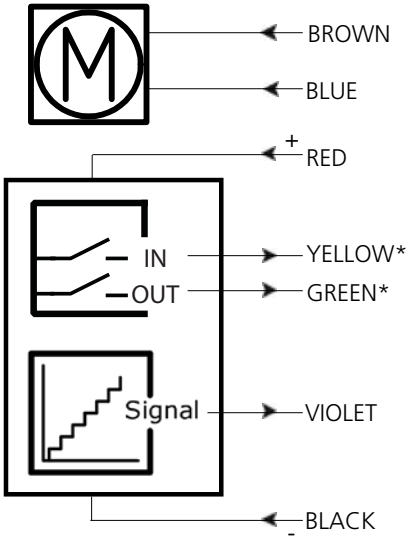
Actuator with absolute positioning - Analogue feedback
I/O specifications:

Input/Output	Specification	Comments
Description	The actuator can be equipped with electronic circuit that gives an analogue feedback signal when the actuator moves. See connection diagram, fig. 7, page 24	
Brown	12, 24 or 36VDC (+/-) 12V ± 20% 24V ± 10% 36V ± 10%	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue	Under normal conditions: 12V, max. 26A depending on load 24V, max. 13A depending on load 36V, max. 10A depending on load	To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
Red	Signal power supply (+) 12-24VDC	Current consumption: Max. 60mA, also when the actuator is not running
Black	Signal power supply GND (-)	
Green	Not to be connected	
Yellow	Not to be connected	
Violet	Analogue feedback 0-10V (Option B) 0.5-4.5V (Option C)	Tolerances +/- 0.2V Max. current output: 1mA Ripple max. 200mV Transaction delay 100ms Linear feedback 0.5% It is recommendable to have the actuator to activate its limit switches on a regular basis, to ensure more precise positioning
White	Not to be connected	

Actuator with endstop signals and absolute positioning - Analogue feedback

Connection diagram:

Fig. 8 : 36xxxxx2B/2Cxxxxxx
36xxxxxxxB00xx-xxxxxxxxxxxxxxx
36xxxxxxxC00xx-xxxxxxxxxxxxxxx



*YELLOW/GREEN:
Endstop signals out are NOT potential free!

If you wish to use the endstop signals, you will have to keep power on the brown, blue, red and black wires, otherwise the signal will be lost.

Actuator with endstop signals and absolute positioning - Analogue feedback

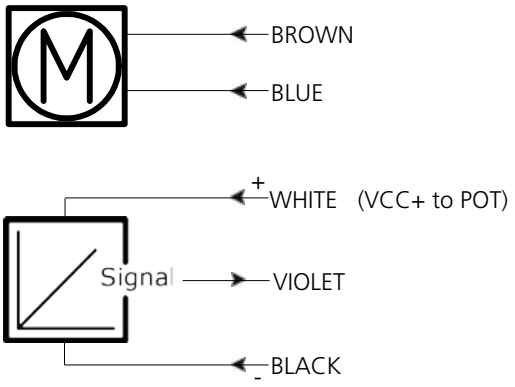
I/O specifications:

Input/Output	Specification	Comments
Description	The actuator can be equipped with electronic circuit that gives an analogue feedback signal when the actuator moves. See connection diagram, fig. 8, page 26	
Brown	12, 24 or 36VDC (+/-) 12V ± 20% 24V ± 10% 36V ± 10%	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue	Under normal conditions: 12V, max. 26A depending on load 24V, max. 13A depending on load 36V, max. 10A depending on load	To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
Red	Signal power supply (+) 12-24VDC	Current consumption: Max. 60mA, also when the actuator is not running
Black	Signal power supply GND (-)	
Green	Endstop signal out	Output voltage min. V_{IN} - 2V Source current max. 100mA NOT potential free
Yellow	Endstop signal in	
Violet	Analogue feedback 0-10V (Option B) 0.5-4.5V (Option C)	Tolerances +/- 0.2V Max. current output: 1mA Ripple max. 200mV Transaction delay 20ms Linear feedback 0.5% It is recommendable to have the actuator to activate its limit switches on a regular basis, to ensure more precise positioning
White	Not to be connected	

Actuator with absolute positioning - Mechanical potentiometer feedback

Connection diagram:

Fig. 9 : 36xxxxx0P/1Pxxxxxx
36xxxxxxxP00xx-xxxxxxxxxxxxxxx



Actuator with absolute positioning - Mechanical potentiometer feedback I/O specifications:

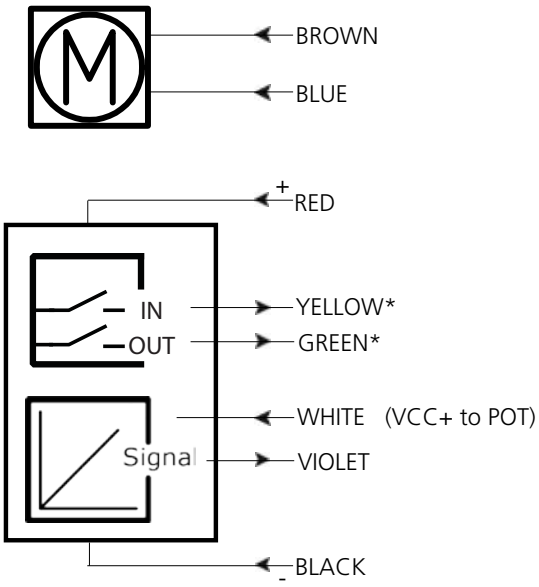
Input/Output	Specification	Comments
Description	The actuator can be equipped with a mechanical potentiometer, 10 kohm. See connection diagram, fig. 9, page 28	 Bourns 0-10 kohm, 5%, 10-Turn Type: 3540 Wirewound
Brown	12, 24 or 36VDC (+/-) 12V ± 20% 24V ± 10% 36V ± 10%	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue	Under normal conditions: 12V, max. 26A depending on load 24V, max. 13A depending on load 36V, max. 10A depending on load	To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
Red	Not to be connected	
Black	Signal power supply GND (-)	
Green	Not to be connected	
Yellow	Not to be connected	
Violet	Mechanical potentiometer output Output range with 8mm spindle pitch: 0 kohm = 0mm stroke 10 kohm = 333mm stroke Output range with 12mm spindle pitch: 0 kohm = 0mm stroke 10 kohm = 500mm stroke Output range with 20mm spindle pitch: 0 kohm = 0mm stroke 10 kohm = 833mm stroke	+10V or other value Output protection: 1 kohm protection resistor Linearity: ± 0.25%
White	VCC+ to POT 10VDC or other values	

Please note that Potentiometer is not possible on variants with fast gear (Spindle pitch 20mm, H Gear).

Actuator with endstop signals and absolute positioning - Mechanical potentiometer feedback

Connection diagram:

Fig. 10 : 36xxxxx2Pxxxxxx
36xxxxxxxP00xx-xxxxxxxxxxxxxxx



*YELLOW/GREEN:
Endstop signals out are NOT potential free!

If you wish to use the endstop signals, you will have to keep power on the brown, blue, red and black wires, otherwise the signal will be lost.

Actuator with endstop signals and absolute positioning - Mechanical potentiometer feedback

I/O specifications:

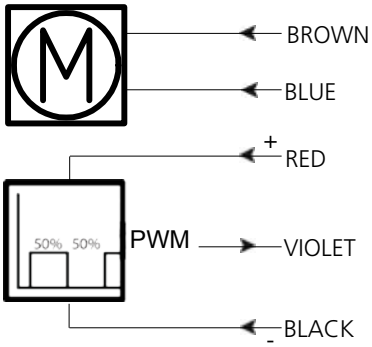
Input/Output	Specification	Comments
Description	The actuator can be equipped with a mechanical potentiometer, 10 kohm. See connection diagram, fig. 10, page 30	 Bourns 0-10 kohm, 5%, 10-Turn Type: 3540 Wirewound
Brown	12, 24 or 36VDC (+/-) 12V ± 20% 24V ± 10% 36V ± 10%	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue	Under normal conditions: 12V, max. 26A depending on load 24V, max. 13A depending on load 36V, max. 10A depending on load	To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
Red	Signal power supply (+) 12-24VDC	For endstop signals
Black	Signal power supply GND (-)	
Green	Endstop signal out	Output voltage min. V_{IN} - 2V Source current max. 100mA NOT potential free
Yellow	Endstop signal in	
Violet	Mechanical potentiometer output Output range with 8mm spindle pitch: 0 kohm = 0mm stroke 10 kohm = 333mm stroke Output range with 12mm spindle pitch: 0 kohm = 0mm stroke 10 kohm = 500mm stroke Output range with 20mm spindle pitch: 0 kohm = 0mm stroke 10 kohm = 833mm stroke	+10V or other value Output protection: 1 kohm protection resistor Linearity: ± 0.25%
White	VCC+ to POT 10VDC or other values	

Please note that Potentiometer is not possible on variants with fast gear (Spindle pitch 20mm, H Gear).

Actuator with absolute positioning - PWM

Connection diagram:

Fig. 11 : 36xxxxx15/16xxxxxx
36xxxxxxxF00xx-xxxxxxxxxxxxxxx



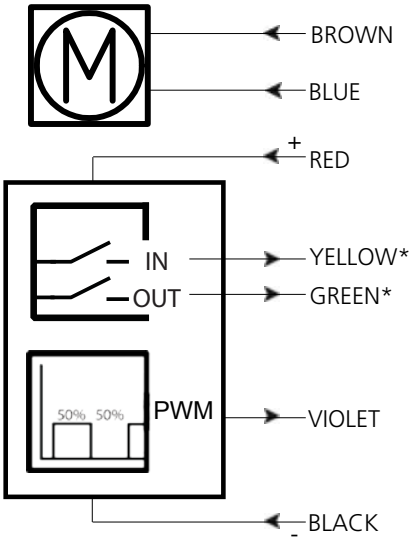
Actuator with absolute positioning - PWM
I/O specifications:

Input/Output	Specification	Comments
Description	The actuator can be equipped with electronic circuit that gives an analogue feedback signal when the actuator moves. See connection diagram, fig. 11, page 32	
Brown	12, 24 or 36VDC (+/-) 12V ± 20% 24V ± 10% 36V ± 10%	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue	Under normal conditions: 12V, max. 26A depending on load 24V, max. 13A depending on load 36V, max. 10A depending on load	To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
Red	Signal power supply (+) 12-24VDC	Current consumption: Max. 60mA, also when the actuator is not running
Black	Signal power supply GND (-)	
Green	Not to be connected	
Yellow	Not to be connected	
Violet	Digital output feedback (PNP) 10-90% (Option 5) 20-80% (Option 6)	Output voltage min. V_{IN} - 2V Tolerances +/- 2% Max. current output: 12mA Frequency: 75Hz It is recommendable to have the actuator to activate its limit switches on a regular basis, to ensure more precise positioning
White	Not to be connected	

Actuator with endstop signals and absolute positioning - PWM

Connection diagram:

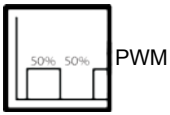
Fig. 12 : 36xxxxx25/26xxxxxx
36xxxxxxxF00xx-xxxxxxxxxxxxxxx



*YELLOW/GREEN:
Endstop signals out are NOT potential free!

If you wish to use the endstop signals, you will have to keep power on the brown, blue, red and black wires, otherwise the signal will be lost.

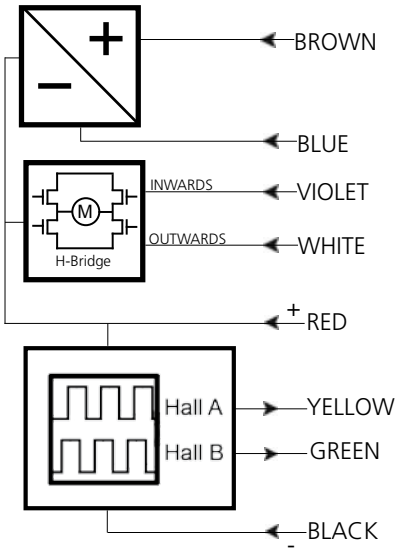
Actuator with endstop signals and absolute positioning - PWM I/O specifications:

Input/Output	Specification	Comments
Description	The actuator can be equipped with electronic circuit that gives an analogue feedback signal when the actuator moves. See connection diagram, fig. 12, page 34	
Brown	12, 24 or 36VDC (+/-) 12V ± 20% 24V ± 10% 36V ± 10%	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue	Under normal conditions: 12V, max. 26A depending on load 24V, max. 13A depending on load 36V, max. 10A depending on load	To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
Red	Signal power supply (+) 12-24VDC	Current consumption: Max. 60mA, also when the actuator is not running
Black	Signal power supply GND (-)	
Green	Endstop signal out	Output voltage min. V_{IN} - 2V Source current max. 100mA NOT potential free
Yellow	Endstop signal in	
Violet	Digital output feedback (PNP) 10-90% (Option 5) 20-80% (Option 6)	Output voltage min. V_{IN} - 2V Tolerances +/- 2% Max. current output: 12mA Frequency: 75Hz It is recommendable to have the actuator to activate its limit switches on a regular basis, to ensure more precise positioning
White	Not to be connected	

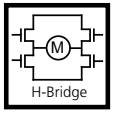
Actuator with old CS36 (H-bridge) version - Dual Hall

Connection diagram:

Fig. 13 : 36xxxxx30/3Hxxxxxx



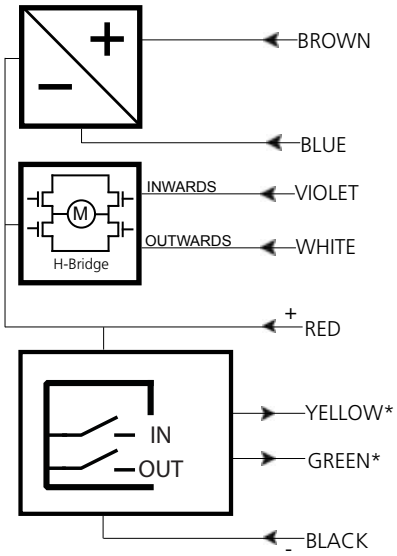
Actuator with old CS36 (H-bridge) version - Dual Hall I/O specifications:

Input/Output	Specification	Comments
Description	The actuator can be equipped with old version of integrated controller. See connection diagram, fig. 13, page 36	
Brown	Only available with 24VDC (+/-) 24V ± 10% Under normal conditions: 24V, max. 13A depending on load **No current cut-off available**	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue		To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
Red	Signal power supply (+) 24VDC	Current consumption: Max. 40mA, also when the actuator is not running
Black	Signal power supply GND (-)	
Green	Hall B	Current output for Hall output (PNP) 12mA
Yellow	Hall A	
Violet	Retracts the actuator	On/off voltages: > 67% of V_{IN} = ON < 33% of V_{IN} = OFF Input current: 10mA
White	Extends the actuator	

Actuator with old CS36 (H-bridge) version - Endstop signals

Connection diagram:

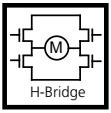
Fig. 14 : 36xxxxx40xxxxxx



*YELLOW/GREEN:
Endstop signals out are NOT potential free!

If you wish to use the endstop signals, you will have to keep power on the brown, blue, red and black wires, otherwise the signal will be lost.

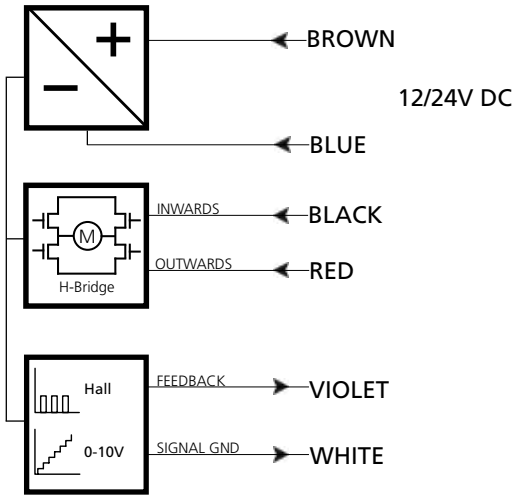
Actuator with old CS36 (H-bridge) version - Endstop signals I/O specifications:

Input/Output	Specification	Comments
Description	The actuator can be equipped with old version of integrated controller. See connection diagram, fig. 14, page 38	
Brown	Only available with 24VDC (+/-) 24V ± 10% Under normal conditions: 24V, max. 13A depending on load **No current cut-off available**	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue		To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
Red	Signal power supply (+) 24VDC	Current consumption: Max. 40mA, also when the actuator is not running
Black	Signal power supply GND (-)	
Green	Endstop signal out	Output voltage min. V_{IN} - 2V Source current max. 100mA NOT potential free
Yellow	Endstop signal in	
Violet	Retracts the actuator	On/off voltages: > 67% of V_{IN} = ON < 33% of V_{IN} = OFF Input current: 10mA
White	Extends the actuator	

Actuator with IC Basic

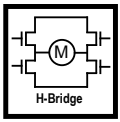
Connection diagram:

Fig. 15 : 36xxxxx7xxxxxxx
36xxxxxxxx03xx-xxxxxxxxxxxxxxx



Please be aware that if the power supply is not properly connected, you might damage the actuator!

Actuator with IC Basic
I/O specifications:

Input/Output	Specification	Comments
Description	Easy to use interface with integrated power electronics (H-bridge). The actuator can also be equipped with electronic circuit that gives an absolute or relative feedback signal. The version with "IC option" cannot be operated with PWM (power supply). See connection diagram, fig. 15, page 40	
Brown	12-24VDC + (VCC) Connect Brown to positive 12V ± 20% 24V ± 10% 12V, current limit 30A 24V, current limit 20A	Note: Do not change the power supply polarity on the brown and blue wires! Power supply GND (-) is electrically connected to the housing If the temperature drops below 0°C, all current limits will automatically increase to 30A
Blue	12-24VDC - (GND) Connect Blue to negative 12V ± 20% 24V ± 10% 12V, current limit 30A 24V, current limit 20A	
Red	Extends the actuator	On/off voltages: > 67% of V_{IN} = ON < 33% of V_{IN} = OFF Input current: 10mA
Black	Retracts the actuator	
Green	Not to be connected	
Yellow	Not to be connected	

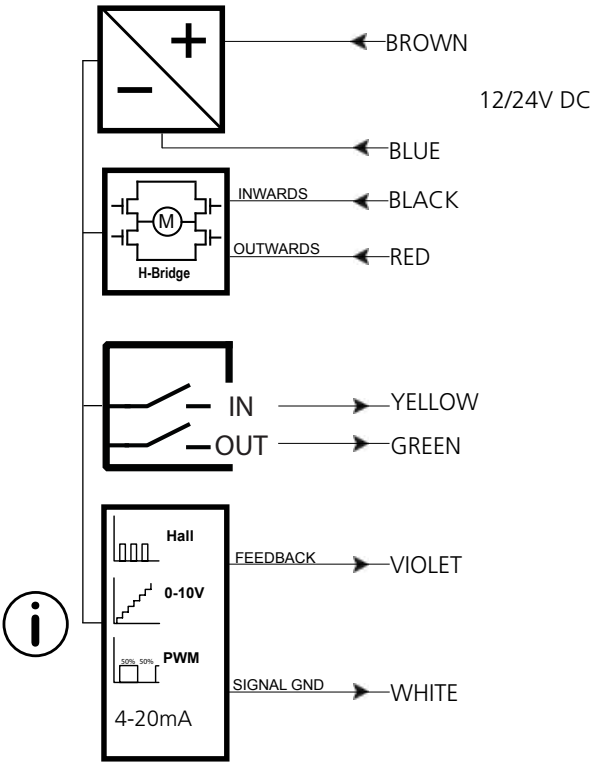
Actuator with IC Basic
I/O specifications:

Input/Output	Specification	Comments
Violet	Analogue feedback 0-10V (Option 7.2)	Standby power consumption: 12V, 60mA 24V, 45 mA Ripple max. 200mV Transaction delay 20ms Linear feedback 0.5% Max. current output: 1mA It is recommendable to have the actuator to activate its limit switches on a regular basis, to ensure more precise positioning
	Single Hall output (PNP) (Option 7.1)	Output voltage min. V_{IN} - 2V Max. current output: 12mA For more information see fig. 5.1, page 21
White	Signal GND	For correct wiring of power GND and Signal GND see page 46

Actuator with IC Advanced - with BusLink

Connection diagram:

Fig. 16 : 36xxxxx8xxxxxxx
36xxxxxxxx03xx-xxxxxxxxxxxxxxx



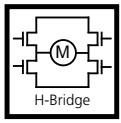
Please be aware that if the power supply is not properly connected, you might damage the actuator!

BusLink is available for IC Advanced and can be used for:
Diagnostics, manual run and configuration

Download BusLink software here: **http://www.linak.com/techline/?id3=2363**

For more information and easy set-up of BusLink, please follow this link to view the Quick Guide for BusLink: **http://www.linak.com/techline/?id3=2356**

Actuator with IC Advanced - with BusLink
I/O specifications:

Input/Output	Specification	Comments
Description	Easy to use interface with integrated power electronics (H-bridge). The actuator can also be equipped with electronic circuit that gives an absolute or relative feedback signal. IC Advanced provides a wide range of possibilities for customisation. The version with "IC option" cannot be operated with PWM (power supply). See connection diagram, fig. 16, page 43	
Brown	12-24VDC + (VCC) Connect Brown to positive 12V ± 20% 24V ± 10% 12V, current limit 30A 24V, current limit 20A	Note: Do not change the power supply polarity on the brown and blue wires! Power supply GND (-) is electrically connected to the housing Current limit levels can be adjusted through BusLink If the temperature drops below 0°C, all current limits will automatically increase to 30A
Blue	12-24VDC - (GND) Connect Blue to negative 12V ± 20% 24V ± 10% 12V, current limit 30A 24V, current limit 20A	
Red	Extends the actuator	On/off voltages: > 67% of V_{IN} = ON < 33% of V_{IN} = OFF Input current: 10mA
Black	Retracts the actuator	
Green	Endstop signal out	Output voltage min. V_{IN} - 2V Source current max. 100mA Endstop signals are NOT potential free. Endstop signals can be configured with BusLink software according to any position needed. Before configuring virtual endstop, an absolute feedback type must be chosen. Only use one virtual endstop - keep one end open for initialisation. (See I/O specifications for endstop on page 15)
Yellow	Endstop signal in	

Actuator with IC Advanced - with BusLink
I/O specifications:

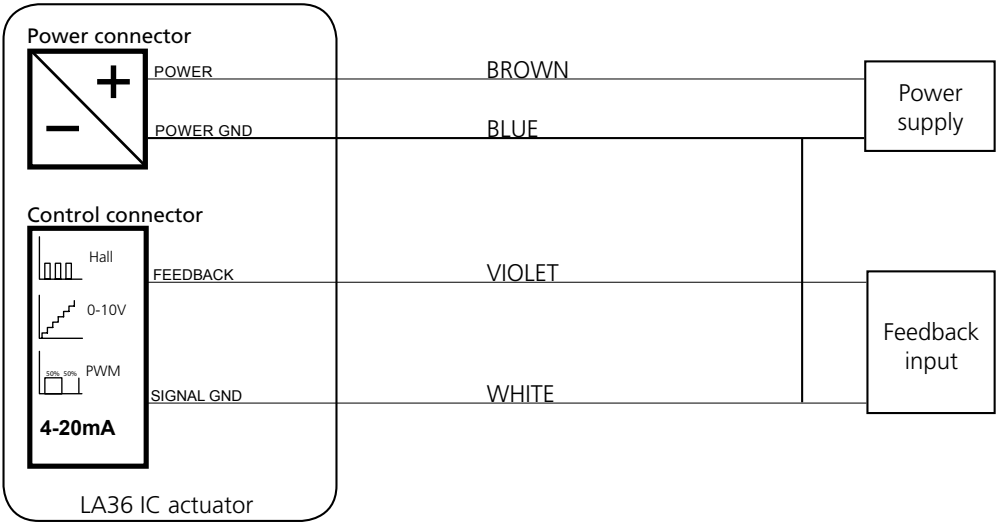
Input/Output	Specification	Comments
Violet	Analogue feedback (0-10V): Configure any high/low combination between 0-10V	Ripple max. 200mV Transaction delay 20ms Linear feedback 0.5% Max. current output. 1mA
	Single Hall output (PNP)	Output voltage min. V_{IN} - 2V Max. current output: 12mA Please be aware that when choosing single hall, feedback position readout and virtual endstops are not available in BusLink. For more information, see fig. 6.1, page 23
	Digital output feedback PWM: Configure any high/low combination between 0-100%	Output voltage min. V_{IN} - 2V Frequency: 75Hz ± 10Hz as standard, but this can be customised. Duty cycle: Any low/high combination between 0 and 100 percent. Open drain source current max. 12mA
	Analogue feedback (4-20mA): Configure any high/low combination between 4-20mA	Tolerances ± 0.2mA Transaction delay 20ms Linear feedback 0.5% Output: Source Serial resistance: 12V max. 300 ohm 24V max. 900 ohm
	All absolute value feedbacks (0-10V, PWM and 4-20mA)	Standby power consumption: 12V, 60mA 24V, 45mA It is recommendable to have the actuator to activate its limit switches on a regular basis, to ensure more precise positioning
White	Signal GND	For correct wiring of power GND and Signal GND see page 46

Please note that the BusLink cables must be purchased separately from the actuator!

Item number for BusLink cables: 0367999

Correct wiring of Power GND and Signal GND for IC Basic and IC Advanced

When using the feedback output, it is important to use the right connection setup. Attention should be paid to the two ground connections. Power GND in the Power connector and Signal GND in the Control connector. When using either 0-10V, Hall or PWM feedback, the Signal GND must be used. For optimal accuracy, the Signal GND is connected to the Power GND as close as possible to the feedback input equipment.

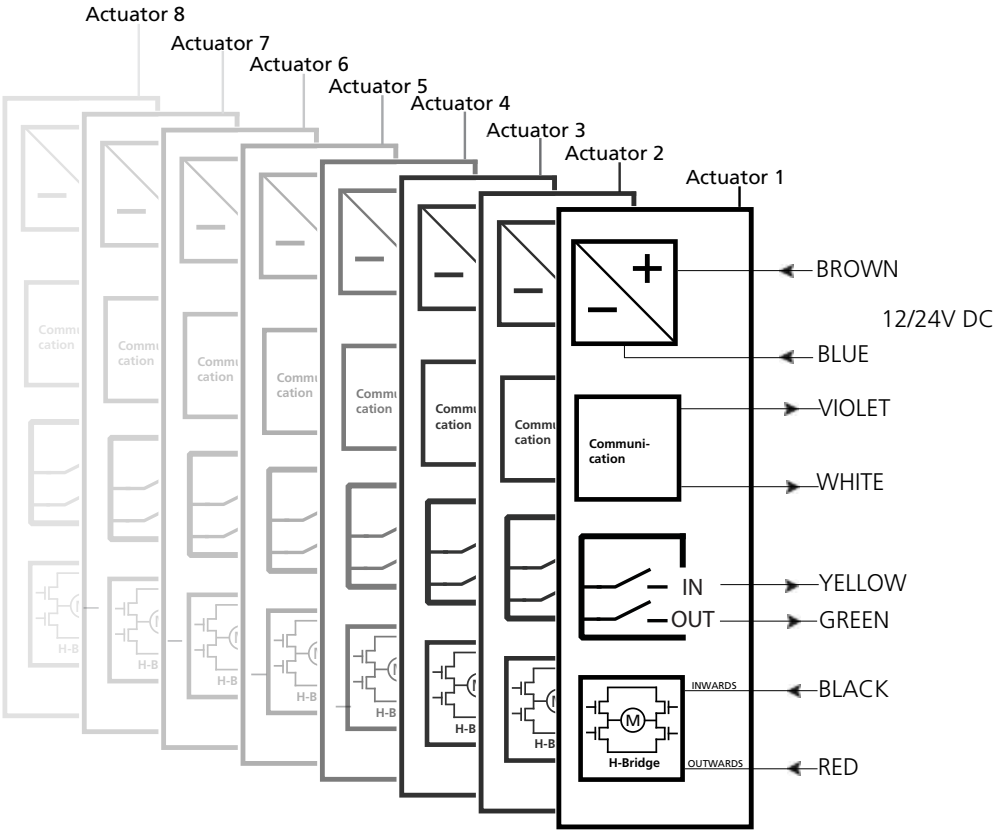


Please note that this section only applies for the following feedback options: 0-10V, Hall and PWM.

Actuator with Parallel

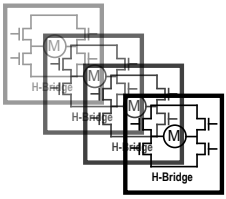
Connection diagram:

Fig. 17 : 36xxxxx9xxxxxxx
36xxxxxxxx03xx-xxxxxxxxxxxxxxx



- Please be aware that if the power supply is not properly connected, you might damage the actuator!
- The green and yellow wires from parallel connected actuators must NOT be interconnected. (See I/O specifications for endstop on page 15).

Actuator with Parallel I/O specifications:

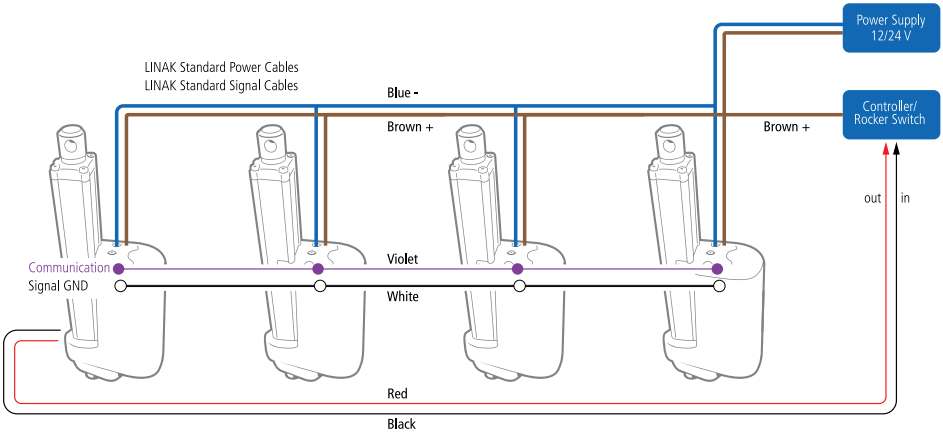
Input/Output	Specification	Comments
Description	Parallel drive of up to 8 actuators. A master actuator with an integrated H-bridge controller controls up to 7 slaves. The version with "IC option" cannot be operated with PWM (power supply). See connection diagram, fig. 17, page 47	
Brown	12-24VDC + (VCC) Connect Brown to positive 12V ± 20% 24V ± 10% 12V, current limit 30A 24V, current limit 20A	Note: Do not change the power supply polarity on the brown and blue wires! The parallel actuators can run on one OR separate power supplies Power supply GND (-) is electrically connected to the housing Current limit levels can be adjusted through BusLink (only one actuator at a time for parallel) If the temperature drops below 0°C, all current limits will automatically increase to 30A
Blue	12-24VDC - (GND) Connect Blue to negative 12V ± 20% 24V ± 10% 12V, current limit 30A 24V, current limit 20A	
Red	Extends the actuator	On/off voltages: > 67% of V_{IN} = ON < 33% of V_{IN} = OFF Input current: 10mA It does not matter where the in/out signals are applied. You can either choose to connect the signal cable to one actuator OR you can choose to connect the signal cable to each actuator on the line. Either way this will ensure parallel drive
Black	Retracts the actuator	

Actuator with Parallel I/O specifications:

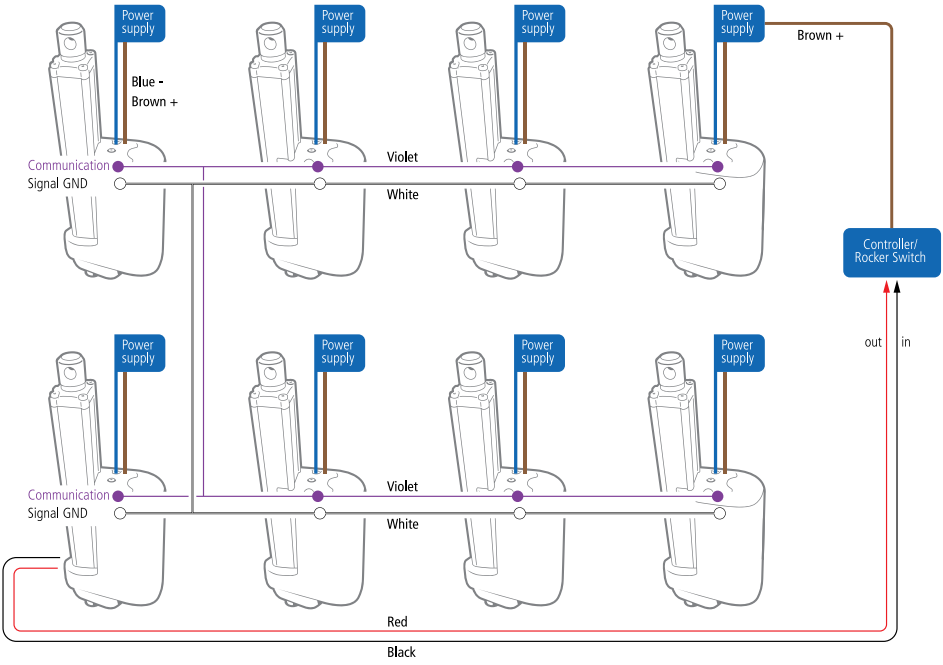
Input/Output	Specification	Comments
Green	Endstop signal out	Output voltage min. V_{IN} - 2V Source current max. 100mA NOT potential free
Yellow	Endstop signal in	
Violet	Parallel communication: Violet cords must be connected together	Standby power consumption: 12V, 60mA 24V, 45mA No feedback available during parallel drive
White	Signal GND: White cords must be connected together	For correct wiring of power GND and Signal GND see page 46

The parallel system

The parallel drive function will support a number of actuators working jointly.



It is both possible to run parallel with a single power supply, or to run each actuator with separate power supplies.



Only standard power and signal cables are available for parallel.

The parallel system

- It does not matter where the IN/OUT signal is applied. The signals of all actuators can be connected together
- When all actuators are connected, a Master will automatically be chosen. E.g. with 5 actuators in one system there will be 1 Master and 4 Slaves. The Master can control up to 7 slaves
- If an overload occurs, the running of the actuators will be stopped and blocked in that direction until an activation in the opposite direction has been made, or the system has been re-powered
- Before entering BusLink mode, all actuators must be disconnected. It is only possible to configure one actuator at a time through BusLink
- When changing the actuator configuration, it is important that all actuators in the system have the same configuration before the system starts running. Otherwise, the actuators will not run
- Actuators will be pre-programmed from our production as 2, 3, 4, 5.. etc. parallel systems. Through BusLink it will be possible to add or remove actuators to/from the system
- In case one of the actuators are broken, the system will not move; not even after re-powering. The broken actuator needs to be replaced, before the system can run again. The system will only run, when it is complete

BusLink is available for Parallel

- BusLink can be used for configuration and diagnostics
- Service counter is available with Parallel

Download BusLink software here: **http://www.linak.com/techline/?id3=2363**

For more information and easy set-up of BusLink, please follow this link to view the Quick Guide for BusLink: **http://www.linak.com/techline/?id3=2356**

Please note that the BusLink cables must be purchased separately from the actuator!
Item number for BusLink cables: 0367999

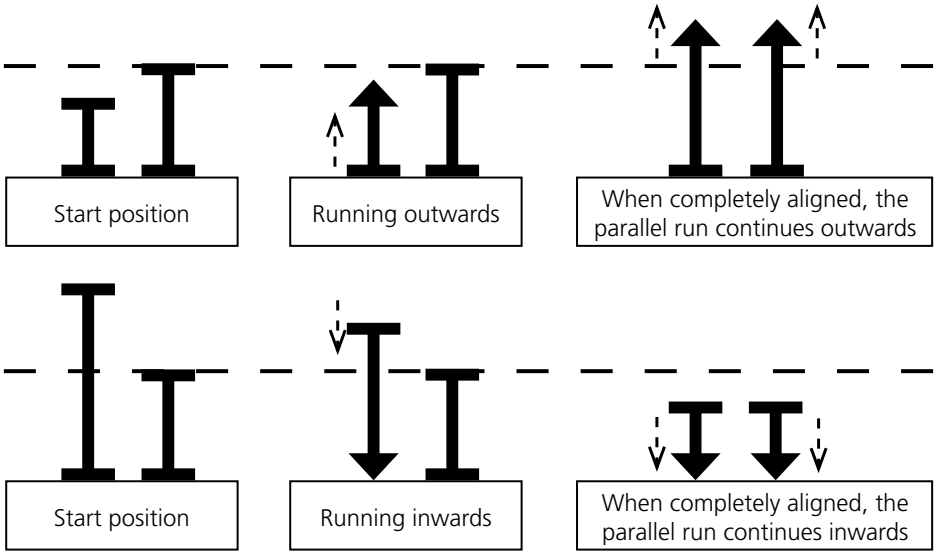
System Monitoring for Parallel

If one of the actuators have one of the following error conditions, the actuator will immediately STOP:

- H-Bridge fault
- Out of the temperature range (High duty cycle protection)
- Overcurrent (Current cut-off if one or all actuators go in mechanical block)
- SMPS fault
- EOS fault switch
- Hall sensor failure
- Position lost
- Overvoltage (43V DC)

Alignment of the parallel actuator system

If the actuators are not in parallel when starting up, the next movement will run in the following manner:

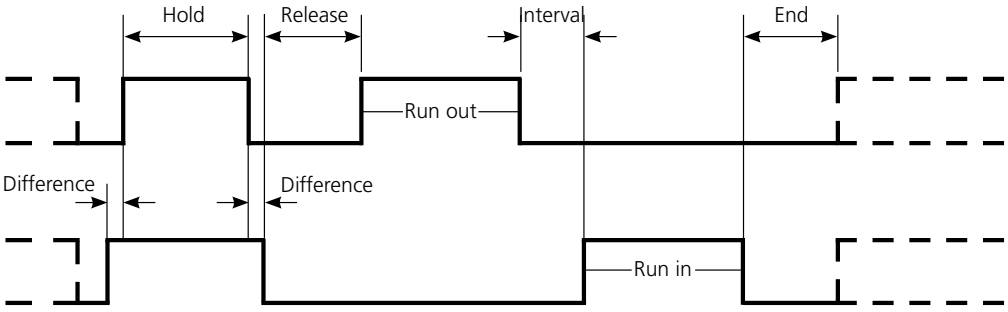


Parallel manual service mode

With the parallel manual service mode it is possible to drive one or more parallel actuators separately, using the red and black wire from each actuator.

Please follow this procedure to manually extend/retract the parallel actuator(s):

	Procedure	Min.	Max.
First step	Disconnect the Purple and White wires between all actuators	-	-
Hold	Put power on the Red and Black wires for 10-30 seconds	10 sec.	30 sec.
Difference	The Red and Black wires must all be connected to the power supply within 0.5 seconds	0 sec.	0.5 sec.
Release	Disconnect all wires and wait 0.5-2 seconds before the next step	0.5 sec.	2 sec.
Extend/Retract	Now choose either to extend or retract the actuator: To extend the actuator: Connect only the Red wire(s) to the power supply To retract the actuator: Connect only the Black wire(s) to the power supply	-	-
Interval	Switch between running in/out as much as needed, without exceeding the 2.0 seconds interval between disconnecting/connecting the Red and Black wires	-	2 sec.
End	To exit the parallel manual mode, diconnect the Red and Black wires for more than 2.0 seconds	2 sec.	-
Back to parallel mode	Before running in standard parallel mode, reconnect all Purple and White wires	-	-



Chapter 3

Troubleshooting

Symptom	Possible cause	Action
No motor sound or movement of piston rod	The actuator is not properly connected to the power supply Customer fuse burned Cable damaged **IC:** Wrongly connected: + Brown, - Blue Signal required for moving outwards: + VCC -> RED Wire Signal required for moving inwards: + VCC -> Black Wire	• Check the connection to the power supply or the external control unit (if any) To extend actuator: Connect Brown to positive and Blue to negative To retract actuator: Connect Brown to negative and Blue to positive • Change cable • Check wire connection (Red/ Black) on control unit • Please contact LINAK
Excessive electricity Consumption	Misalignment or overload in application	• Align or reduce load • Try to run the actuator without load • Please contact LINAK
Motor runs but spindle does not move	Gearing system or spindle damaged	• Please contact LINAK
Actuator cannot lift full load	Clutch is worn Motor is damaged Insufficient power supply **IC:** Current cut off (overload in application)	• Align or reduce load • Check power supply **For IC advanced and Parallel only:** Connect actuator to BusLink and check the current parameters (inwards/outwards) • Please contact LINAK

Troubleshooting

Symptom	Possible cause	Action
No signal from Feedback	Wrongly Connected: Violet: Signal out White: Signal GND Yellow: Endstop In Green: Endstop Out	• Check wiring
	Cable damaged Bad connection Potentiometer damaged Hall sensor or magnet damaged	• Change cable
	For IC Advanced only: Check Feedback option - connect to BusLink	**For IC Advanced only:** Connect actuator to BusLink and check current parameters. Initialise the actuator in both directions • Please contact LINAK
Motor runs too slowly or does not run with full force	Load is higher than specified Voltage drop in cable (Use of long cables can negatively affect the performance of the actuator)	• Reduce load
Motor runs in smaller steps	Insufficient power supply	• Check power supply
	IC: Current Cut-off	**IC:** Connect actuator to BusLink and check current parameters (reason for last stop). For more info, please see page 57
Actuator(s) cannot hold the chosen load	Load is higher than specified	• Reduce load

Troubleshooting for Parallel

Symptom	Possible cause	Action
No actuators in movement	Power supply	• Check power supply source and power connections: Brown + Blue - **Please be aware that if the power supply is not properly connected, you might damage the actuator**
	Signal connections	• Check parallel communications: Violet = Communication Violet cords must be connected together White = Signal GND White cords must be connected together
	Signal required for moving outwards: + VCC (Red wire) Signal required for moving inwards: + VCC (Black wire)	• Check wire connection (Red/ Black) on control unit
	• Put power on all actuators at the same time, after everything is connected. Then wait 10 seconds before signals for moving In/Out are activated	
Actuator(s) cannot lift full load	Load is higher than specified	• Reduce load • Check for sufficient power supply current • Connect actuator via BusLink one at the time and check monitoring for each actuator (reason for last stop)
Short movements before stops	Actuator NOT connected properly Violet = Parallel communication White = Signal GND	• Check wire connection (Violet/ White) • If OK - Connect actuators via BusLink one at the time and check monitoring for each actuator (reason for last stop). For more info, please see page 57

Troubleshooting for Parallel

Symptom	Possible cause	Action
Signal cable damaged or removed under operation	All actuators stop at the same position	• When seeing a communication error, the system goes into 'position lost' • The signal and power cables MUST be connected to all actuators again • Afterwards, the Parallel system needs re-powering • If one actuator is missing, the system will not work, not even after re-powering
BusLink monitoring: Reason for last stop	H-bridge fault SMPS fault	• Please contact your local supplier for further instructions
	Overcurrent	• The Parallel system cannot continue in the same direction • Reactivation is needed in the opposite direction
	EOS OUT error EOS IN error	• The Parallel system stops at the same time. When seeing an EOS error, the actuator goes into 'position lost', and the system will need initialisation (to initialise, move the actuators into fully retracted position)
	Hall error	• The system stops at the same position. When seeing hall error, the actuator goes into 'position lost', and the system will need initialisation (to initialise, move the actuators into fully retracted position)
	Out of range temperature for ambient location Out of range temperature at FET location The above can be due to high environment temperature or high duty cycle	• The error causes the actuators to stop. After elimination of the error (cooling down) and reactivation of the movement, the actuators will move normally • This may not be used for stop of the system

Troubleshooting for Parallel

Symptom	Possible cause	Action
BusLink monitoring: Reason for last stop	Overvoltage	• When seeing overvoltage, the system stops at the same time. The system needs re-powering and In/Out signals must be removed before next movement
	Undervoltage	• When seeing undervoltage, the system stops at the same time. The system needs re-powering and In/Out signals must be removed before next movement

For more information and easy set-up of BusLink, please follow this link to view the Quick Guide for BusLink: **http://www.linak.com/techline/?id3=2356**

Be aware of Modbus actuator - please see the Modbus installation guide: **http://www.linak.com/techline/?id3=2363**

Chapter 4

Specifications

Motor:	Permanent magnet motor 12, 24, or 36V *
Cable:	Motor: 2 x 14 AWG PVC cable Control: 6 x 20 AWG PVC cable **
Gear ratio:	6 different gear ratios available in steel (500 N, 1,700/2,600 N, 4,500 N, and 6,800/10,000 N)
Slip clutch:	Mechanical overload protection through an integrated slip clutch
Brake:	Integrated brake ensures a high self-locking ability. The brake is deactivated when the actuator is powered to obtain a high efficiency
Hand crank:	As a standard feature the actuator can be operated manually
Housing:	The housing is made of casted aluminium, coated for outdoor use and in harsh conditions
Spindle part:	Outer tube: Extruded aluminium anodised Inner tube: Stainless steel AISI304/SS2333 Acme spindle: Trapezoidal spindle with high efficiency
Temperature range:	- 30° C to +65° C - 22° F to +150° F Full performance +5° C to +40° C
End play:	2 mm maximum
Weather protection:	Rated IP66 for outdoor use. Furthermore, the actuator can be washed down with a high-pressure cleaner (IP69K)

Usage:

- The duty cycle at max. load is 20% on time. This means if the actuator runs continuously for 20 seconds it must remain off for 80 seconds before operating again.
  NB. At 10,000 N only 5%
- Storage temperature: -55° C to +105° C
- **Safety device regarding functional failure:**

  Safety nut
  The LA36 has a built-in safety nut in push as an option. Actuators with safety nut in push can only function when used in push applications. The safety nut comes into operation should the main nut fail. Afterwards it is only possible to drive the actuator into the innermost position. Thereafter, the actuator will not function any more and must be sent for service

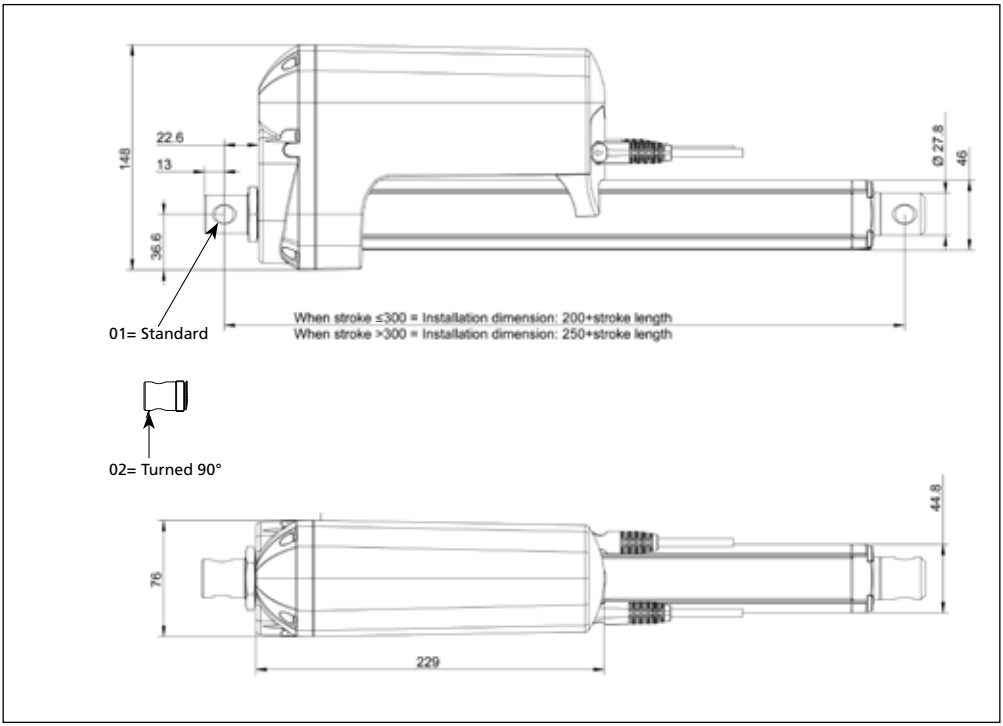
  Mechanical endstop
  LA36 is equipped with mechanical endstop

* Modbus actuators only 24V - please see the Modbus installation guide:
http://www.linak.com/techline/?id3=2363

** Special control cabels for the Modbus actuator - please see the Modbus installation guide:
http://www.linak.com/techline/?id3=2363

Actuator dimensions

TECHLINE® LA36:

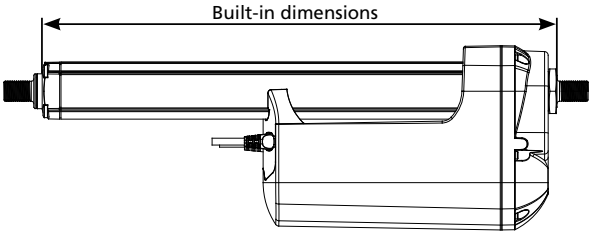


Built-in dimensions

Piston rod	"0" /from the surface		"1" / to the centre of the hole		"2A" / to the centre of the hole		"3" / from the surface	
Back fixture	Stroke <=300 Stroke > 300		Stroke <=300 Stroke > 300		Stroke <=300 Stroke > 300		Stroke <=300 Stroke > 300	
"0" / from the surface	189	239	194	244	194	244	181	231
"1" and "2" / to the centre of the hole	195	245	200	250	200	250	187	237
"3" and "4" / to the centre of the hole	195	245	200	250	200	250	187	237
"5" / from the surface	180	230	185	235	185	235	173	223
"6" / from the surface	180	230	185	235	185	235	173	223
"7" and "8" / to the centre of the hole	195	245	200	250	200	250	187	237
"A" and "B" / to the centre of the hole	195	245	200	250	200	250	187	237
"C" and "D" / to the centre of the hole	195	245	200	250	200	250	187	237

Piston rod	"4" /from the surface		"5" / to the centre of the hole		"C" / to the centre of the hole		"D" / from the surface	
Back fixture	Stroke <=300 Stroke > 300		Stroke <=300 Stroke > 300		Stroke <=300 Stroke > 300		Stroke <=300 Stroke > 300	
"0" / from the surface	181	231	194	244	209	259	209	259
"1" and "2" / to the centre of the hole	187	237	200	250	215	265	215	265
"3" and "4" / to the centre of the hole	187	237	200	250	215	265	215	265
"5" / from the surface	172	222	185	235	200	250	200	250
"6" / from the surface	172*	222*	185	235	200	250	200	250
"7" and "8" / to the centre of the hole	187	237	200	250	215	265	215	265
"A" and "B" / to the centre of the hole	187	237	200	250	215	265	215	265
"C" and "D" / to the centre of the hole	187	237	200	250	215	265	215	265

* These built-in dimensions are measured according to the illustration below.



Manual Hand Crank

The manual hand crank can be used in the case of power failure.

The cover over the Allen key socket must be unscrewed before the Allen key can be inserted and the hand crank operated.

Hand Crank Torque: 6 - 8 Nm
Hand Crank rpm: Max. 65

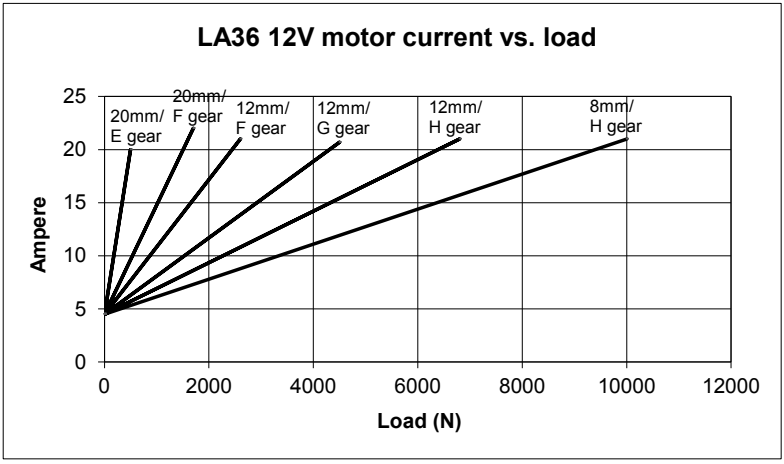
Piston rod movement per turn, app.:

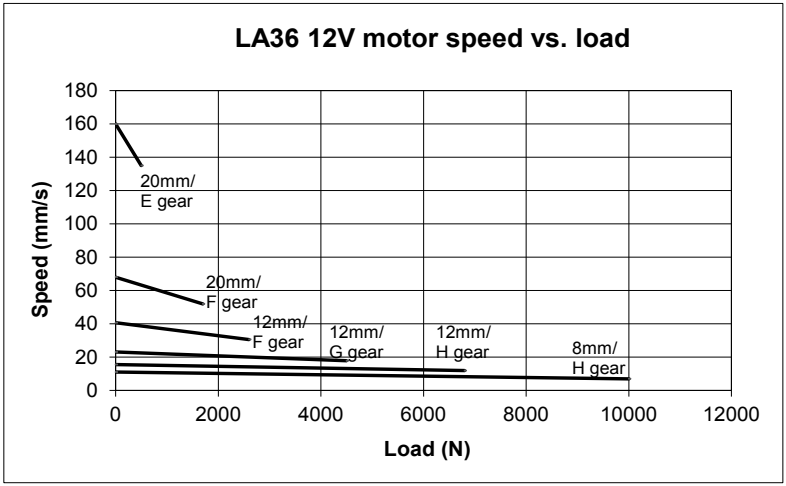
	8 mm	12 mm	20 mm
Gear A	-	11 mm	18 mm
Gear B	-	6 mm	10 mm
Gear C	3 mm	4 mm	7 mm
Gear F	-	-	27 mm

- The power supply has to be disconnected during manual operation
- If the actuator is operated as a Hand crank, it must only be operated by hand, otherwise there is a potential risk of overloading and hereby damaging the actuator.

Speed and current curves - 12V motor

The values below are typical values and made with a stable power supply and an ambient temperature of 20°C.



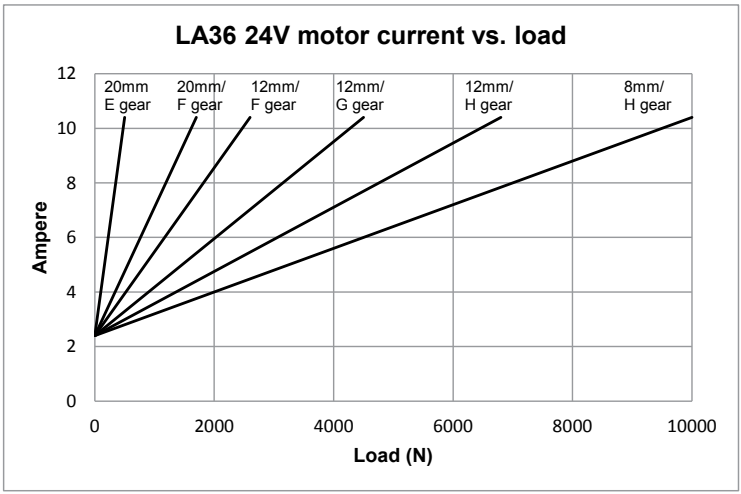


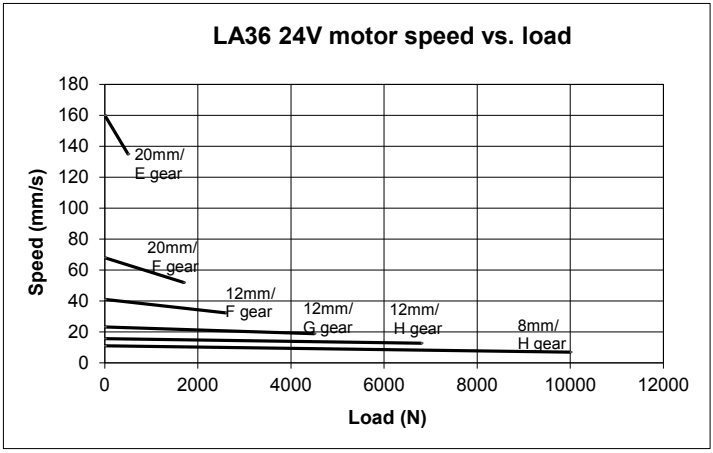
All measurements above describe the spindle pitch (e.g. 20mm) and the gear type (e.g. E gear) of the actuator.

Speed and current are based on a nominal power supply of 12, 24, 36VDC.

Speed and current curves - 24V motor

The values below are typical values and made with a stable power supply and an ambient temperature of 20˚C.



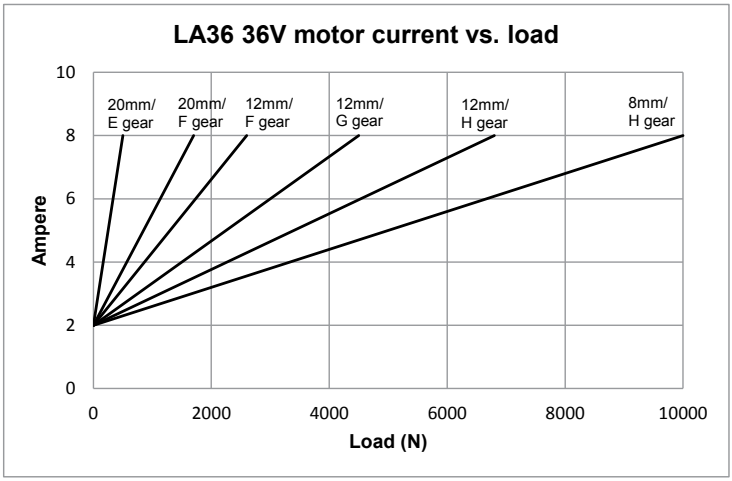


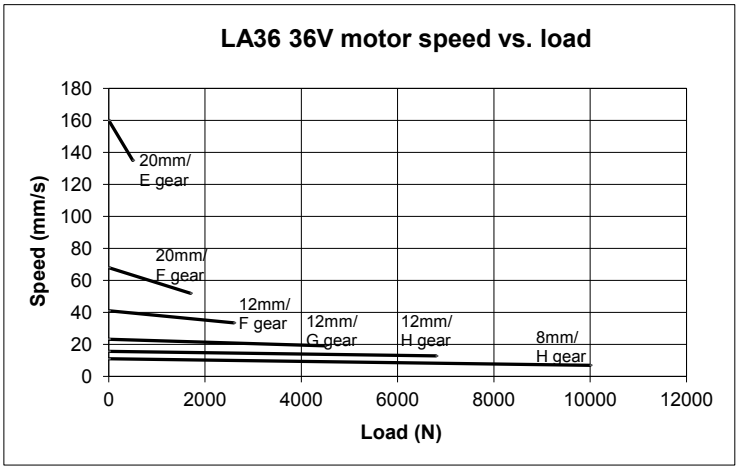
All measurements above describe the spindle pitch (e.g. 20mm) and the gear type (e.g. E gear) of the actuator.

Speed and current are based on a nominal power supply of 12, 24, 36VDC.

Speed and current curves - 36V motor

The values below are typical values and made with a stable power supply and an ambient temperature of 20˚C.





All measurements above describe the spindle pitch (e.g. 20mm) and the gear type (e.g. E gear) of the actuator.

Speed and current are based on a nominal power supply of 12, 24, 36VDC.

Label for LA36

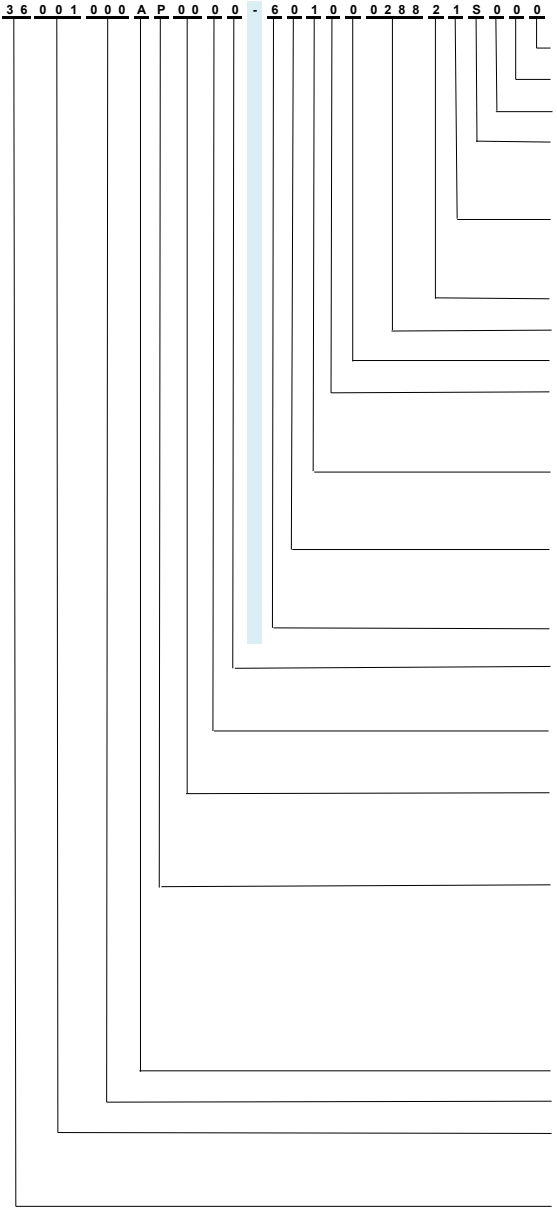
1. **Type: 36120250A001BA-646G304500X0000**
   Describes the basic functionality of the product
2. **Item no.: J06292**
   Sales and ordering code
3. **Prod. Date: YYYY.MM.DD**
   Production date describes when the product has been produced. This date is the reference for warranty claims
4. **Max Load: Push 4500N / Pull 4500N IP66**
   Describes the maximum load that the product can be exposed to in compression and tension. This line also contains a reference to the product's IP protection degree
5. **Power Rate: 24VDC / Max. 13 Amp**
   Input voltage for the product and maximum current consumption
6. **Duty Cycle: 20%, Max. 4 min. / 16 min.**
   The duty cycle defines the maximum period during operation without interruption. After operation, a pause must be observed. It is important that the operator follows the instructions of the duty cycle; otherwise, a possible overload may result in reduced product life/errors
7. **W/O #1234567-0001**
   The LINAK work order followed by a unique sequential identification number

Key to symbols

The following symbols are used on the LA36 label:

Symbol	Norms	Approvals
	WEEE Directive 2002/96/EC	Wheelie bin
	Compliance to all relevant EC directives	CE
	C-Tick 2002: The Australian EMC	C-Tick
	China Pollution control mark (also indicates recyclability)	China RoHS legislation
	ISO 7000- 0434A: Caution	
	Operating instructions	

LA36
Ordering example Econ



* IC INTEGRATED CONTROLLER

IC options:	IC	LINbus	Modbus	Parallel
LA36 actuator:	√	√	√	√

LA36

Ordering example

36 0 0 0 0 + 0 0 0 0 0 0 0 0

CABLE:
0 = No cable
1 = 1.5 m power cable (0367046-1500)
2 = 5 m power cable (0367046-5000)
3 = 0.2 m power cable with AMP connector (0367006)
4 = 1.5 m power and 1,5 signal (0367046-1500+0367049-1500)
5 = 5 m power and 5 m signal (0367046-5000+0367049-5000)
6 = 1.5 m Y-cable, power and signal in one (0367020)
7 = 5 m power Cable + Data cable M12x1 (Bus)

IP-DEGREE:
2 = Standard (IP66)
8 = IP66 ATEX / IECEx approved
9 = Harsh environment housing + IP66/IP69K (Special article number only)

MOTOR TYPE:
A = 12 V DC with clutch
B = 24 V DC with clutch
C = 36 V DC with clutch
1 = 12 V DC with dummy clutch (as standard only with IC)
2 = 24 V DC with dummy clutch (as standard only with IC)

STROKE LENGTH:
XXX = mm Acme spindle: 100, 150....999 mm

FEEDBACK:

Standard and IC:
0 = Standard (No feedback)
5 = PWM 10-90%
6 = PWM 20-80%

Only standard:
B = Analogue feedback 0 - 10V
C = Analogue feedback 0.5 - 4.5V
H = Dual Hall
P = Potentiometer
K = Single hall

Only IC:
D = Bus
1 = Single Hall
2 = Analogue feedback 0-10V
3 = Analogue feedback 0.5-4.5V
4 = Analogue feedback 4-20 mA

END STOP:
0 = With out limt switches
1 = With limt switches
2 = With limt switches and end-stop signals
7 = IC Basic
8 = IC Advanced
9 = Parallel
A = Modbus (Special article number only)
B = LINBUS

SAFETY NUT
+ = Standard
S = With safety nut - only in push

PISTON ROD EYE:

0 = M20 X 1 female adapter	0361016
1 = ø 12.9 mm hole, for 1/2" pin	0361018-B
2 = ø 12.2 mm hole, for 12 mm pin	0361109-B
3 = M12 X 1.75 male adapter	0361224
4 = M16 X 1.5 male adapter	0361135
5 = ø 12.2 hole with slot (Like LA34)	0361138
A = ø 12.2 hole with slot AISI 304	0361260
B = ø 12.9 hole with slot AISI 304	0361275
C = ø 12 H7 Ball Eye AISI 304	0361350
D = ø 16 H7 Ball Eye AISI 304	0361351

BACK FIXTURE:

0 = M20 X 1 female adapter	0361128
1 = ø 12.9 mm hole, for 1/2" pin	0361129
2 = ø 12.9 mm hole turned 90°, for 1/2" pin	0361129
3 = ø 12.2 mm hole, for 12 mm pin	0361119
4 = ø 12.2 mm hole turned 90°, for 12 mm pin	0361119
5 = M12 X 1.75 male adapter	0361126
6 = M16 X 1.5 male adapter	0361247
7 = ø 12.3 hole with slot (Like LA34)	0361140
8 = ø 12.3 hole with slot (LA34) turned 90°	0361140
A = ø 12.2 hole with slot AISI 304	0361261
B = ø 12.2 hole with slot AISI 304 turned 90°	0361261
C = ø 12.9 hole with slot AISI 304	0361276
D = ø 12.9 hole with slot AISI 304 turned 90°	0361276

GEARBOX:

	2.5 mm pitch	8 mm pitch	12 mm pitch	20 mm pitch
A = Gear ratio 1 : 18	N.A.	N.A.	2.600 N	1.700 N
B = Gear ratio 1 : 31	N.A.	N.A.	4.500 N	N.A.
C = Gear ratio 1 : 46	10.000 N	10.000 N	6.800 N	N.A.
* F = Gear ratio 1 : 7	N.A.	N.A.	N.A.	500N

*(Special article number only)

SPINDLE TYPE:
1 = 1-threaded acme spindle (2.5 mm pitch)
2 = 2-threaded acme spindle (8 mm pitch)
3 = 3-threaded acme spindle (12 mm pitch)
5 = 5-threaded acme spindle (20 mm pitch)
A = 2 + adjustable reed limit switches (on outer tube)
C = 3 + adjustable reed limit switches (on outer tube)
E = 5 + adjustable reed limit switches (on outer tube)

ACTUATOR TYPE:
36 = LA36

When ordering standard stroke length with endstop 1, 2, 3 or 4 the stroke length will be up to 4 mm shorter.

Chapter 5

Maintenance

- The actuator must be cleaned at regular intervals to remove dust and dirt and inspected for mechanical damages or wear.
- Inspect attachment points, wires, piston rod, cabinet, and plug, as well as check that the actuator functions correctly.
- To ensure that the pregreased inner tube remains lubricated, the actuator must only be washed down when the piston rod is fully retracted.
- The actuator is a closed unit and therefore requires no internal maintenance.
- In order to maintain a proper performance of the spherical eyes and to increase the resistance against environmental wear, we strongly recommend that the spherical eyes (ball bearings) mounted on actuators from LINAK are greased with anticorrosive grease or similar.

Repair

Only an authorised LINAK® service centre should repair LINAK actuator systems. Systems to be repaired under warranty must be sent to an authorised LINAK service centre.
In order to avoid the risk of malfunction, all actuator repairs must only be carried out by an authorised LINAK Service shop or repairer, as special tools and parts must be used.
If a system is opened by unauthorised personel there is a risk that it may malfunction at a later date.

Main groups of disposal

LINAK's products may be disposed of, possibly by dividing them into different waste groups for recycling or combustion.

Product	Metal scrap	Cable scrap	Electronic scrap	Plastic recycling or combustion
LA36	X	X	X	X

We recommend that our product is disassembled as much as possible at the disposal and that you try to recycle it.

Warranty

There is an 18 months' warranty on TECHLINE products against manufacturing faults calculated from the production date of the individual products (see label). LINAK's warranty is only valid in so far as the equipment has been used and maintained correctly and has not been tampered with. Furthermore, the actuator must not be exposed to violent treatment. In the event of this, the warranty will be ineffective/ invalid. For further details, please see standard terms of sale and delivery for LINAK A/S.

Note:
Only an authorised LINAK® service centre should repair LINAK actuator systems. Systems to be repaired under warranty must be sent to an authorised LINAK service centre.
In order to avoid the risk of malfunction, all actuator repairs must only be carried out by an authorised LINAK Service shop or repairer, as special tools and parts must be used.
If a system is opened by unauthorised personel there is a risk that it may malfunction at a later date.

The actuator is not to be opened by unauthorised personnel. In case the actuator is opened, the warranty will be invalid.

DECLARATION OF CONFORMITY

LINAK A/S
Smedevænget 8

DK - 6430 Nordborg

hereby declares that
LINAK Actuator 36xxxxx0xxxxxx, 36xxxxx1xxxxxx, 36xxxxx2xxxxxx, 36xxxxx5xxxxxx

complies with the EMC Directive: 2014/30/EU according to following standards:
EN 55016-2-1:2009, EN 55016-2-3:2010+A1+AC, EN 55022:2011+AC Class B, EN 55025:2008
EN 61000-4-2:2009, ISO 10605:2008, EN 61000-4-3:2006+A1, ISO 11452-2:2004, EN 61000-4-5:2006,
ISO 7637-2:2004,

complies with RoHS2 Directive 2011/65/EU according to the standard:
EN 50581:2012

Additional information:
The system does also comply with the standard:
EN 55025:2008 Vehicles, boats and internal combustion engines - Radio disturbance characteristics - Limits and methods of measurement for the protection of on-board receivers: Radiated disturbance

Nordborg, 2014-06-23

LINAK A/S
John Kling, B.Sc.E.E.
Certification and Regulatory Affairs
Authorized to compile the relevant technical documentation

Original Declaration

DECLARATION OF CONFORMITY

LINAK A/S
Smedevænget 8

DK - 6430 Nordborg

hereby declares that

Actuator 36xxxxxADxxxBxx (LA36 BUS)

complies with the EMC Directive: 2014/30/EU according to following standards:
EN 61000-6-1:2007, EN 61000-6-2:2005, EN 61000-6-3:2007, EN 61000-6-4:2007

complies with RoHS2 Directive 2011/65/EU according to the standard:
EN 50581:2012

Additional information:
The system does also comply with the standard:
DS/EN ISO 14982:1998 Agricultural and forestry machines - Electromagnetic compatibility - Test methods and acceptance criteria
DS/EN 13309:2001 Construction machinery - Electromagnetic compatibility of machines with internal power supply
ISO 13766:2006 Earth-moving machinery - Electromagnetic compatibility
and EMC requirements of:
DS/EN 60204-1:2006 Safety of machinery - Electrical equipment of machines - Part 1: General requirements
DS/EN 60204-32:2008 Safety of machinery - Electrical equipment of machines - Part 32: Requirements for hoisting machines

Nordborg, 2014-06-23

LINAK A/S
John Kling, B.Sc.E.E.
Certification and Regulatory Affairs
Authorized to compile the relevant technical documentation

Original Declaration

DECLARATION OF CONFORMITY

LINAK A/S

Smedevænget 8

DK - 6430 Nordborg

Hereby declares that

Actuator	LA36IC (36xxxxx7xxxxxxx, 36xxxxx8xxxxxxx, 36xxxxx9xxxxxxx, 36xxxxxBxxxxxxx) LA36IC (36xxxxxxxx03xxxxxxxxxxxxxxxxx)

complies with the EMC Directive 2014/30/EU according to following harmonized standards:

EN 61000-4-2:2009, EN 61000-4-3:2006+A1+A2, EN 61000-4-4:2012, EN 61000-4-5:2014, EN 61000-4-6:2014, EN 61000-4-8:2010, EN 55016-2-3:2010+A1, EN 55016-2-1:2014, EN 55025:2008

complies with RoHS2 Directive 2011/65/EU according to the standard:
EN 50581:2012

Additional information:

The device does comply with the standards:
EN 61000-6-1:2007, Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments
EN 61000-6-3:2007, Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments
EN 61000-6-2:2005, Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-4:2007, Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

The device does also comply with the standards:
ISO 10605:2008, Road vehicles -- Test methods for electrical disturbances from electrostatic discharge
ISO 11452-4:2005, Road vehicles -- Component test methods for electrical disturbances from narrowband radiated electromagnetic energy -- Part 4: Harness excitation methods
ISO 11452-2:2004, Road vehicles -- Component test methods for electrical disturbances from narrowband radiated electromagnetic energy -- Part 2: Absorber-lined shielded enclosure
ISO 7637-2:2004, Road vehicles -- Electrical disturbances from conduction and coupling -- Part 2: Electrical transient conduction along supply lines only

Nordborg, 2014-11-06

LINAK A/S
John Kling, B.Sc.E.E.
Certification and Regulatory Affairs
Authorized to compile the relevant technical documentation

Original declaration

DECLARATION OF INCORPORATION OF PARTLY COMPLETED MACHINERY

LINAK A/S
Smedevænget 8
DK - 6430 Nordborg

Herewith declares that LINAK TECHLINE ® products
as characterized by the following models and types:

Linear Actuators LA12, LA14, LA22, LA23, LA25, LA30, LA35, LA36, LA37

comply with the following parts of the Machinery Directive 2006/42/EC, ANNEX I, *Essential health and safety requirements relating to the design and construction of machinery*:

1.5.1 Electricity supply

The relevant technical documentation is compiled in accordance with part B of Annex VII and that this documentation or part hereof will be transmitted by post or electronically to a reasoned request by the national authorities.

This partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the Machinery Directive 2006/42/EC where appropriate.

Nordborg, 2014-10-20

LINAK A/S
John Kling, B.Sc.E.E.
Certification and Regulatory Affairs
Authorized to compile the relevant technical documentation

Original Declaration

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