BIGHANNA™
composter

# OPERATIONAL MANUAL

## Bin tipper 'Hanna' for 80 liters standard wheelie bins

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SUSTECO_ HANNA_BIN_TIPPER_13005_en

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**ORIGINAL**

It is recommended that this manual is read before the Hanna Bin tipper is installed and used. The Company in charge of installation shall ensure that all employees are informed about the contents in this manual before installation or if the machine is moved. This manual shall be stored in a manner so that it is kept safe for the lifespan of the bin tipper. This manual informs the customer on how to use the bin tipper. Susteco AB takes no responsibility for damage or breakdown caused by usage of the bin tipper in any way than is described in this manual.

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DECLARATION OF CONENTS

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# 1 MANUFACTURER

GSP Produktion AB
Stationsvägen 4
748 41 ÖRBYHUS
SWEDEN

Phone: +46 (0)295 25560
Email: info@gspprod.se
Web: www.gspprod.se

# 2 SAFETY

## 2.1 CE

This bin tipper is CE-marked.

## 2.2 SAFETY INSTRUCTIONS

### 2.2.1 STARTER

⚠ **INSTALLATION MUST ONLY BE MADE BY AUTHORIZED PERSONNEL.**
The bin tipper is anchored in the floor with expander bolt (4pcs. 8X100 mm).
Additional installations shall not be made without authorisation from the manufacturer. If additional installations are made warranties and instructions from the manufacturer are void.

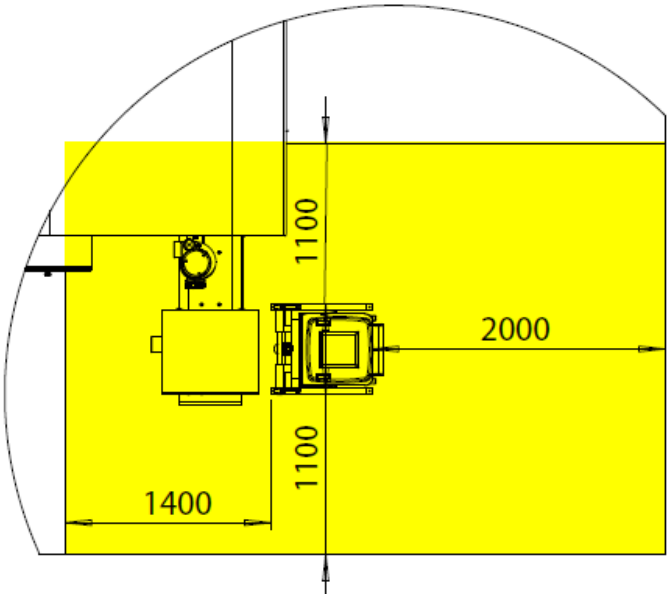
### 2.2.2 LOAD

Maximum load, 100 kg must not be exceeded.

### 2.2.3 OPERATIONAL

⚠ **WARNING: THIS MACHINE SHOULD BE OPERATED BY AUTHORISED PERSONNEL ONLY FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THE EQUIPMENT AND THE HAZARDS INVOLVED. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY.**

### 2.2.4 RISK AREA




⚠ **THE TWO-HAND DEVICE MUST BE INSTALLED OUTSIDE THE RISK AREA. THE OPERATOR MUST HAVE A CLEAR VIEW OF THE RISK AREA DURING OPERATION. THE RISK AREA MUST NOT BE ENTERED WHEN THE BIN TIPPER IS IN OPERATION.**

### 2.2.5 OTHERS

**⚠ MAKE SURE THAT WARNING LABELS, MARKED RISK AREA AND THE SIGN ON THE MACHINE IS KEPT CLEAN FROM DIRT AND THAT THEY ARE NOT DAMAGED.**

**⚠ THE POWER SUPPLY MUST BE SWITCHED OFF AT THE MASTER SWITCH AND LOCKED BEFORE REPAIRING OR SERVICING THE BIN TIPPER.**

**⚠ THE BIN TIPPER SHALL BE IN 'DOWN' POSITION WITHOUT LOAD DURING SERVICE AND MAINTENANCE.**

**⚠ CONTROL OVER THE RISK AREA SHOULD BE MAINTAINED SO THAT NO UNAUTHORISED PERSONS ARE ADJACENT TO THE BIN TIPPER DURING SERVICE AND MAINTENANCE.**

## 3 MACHINERY

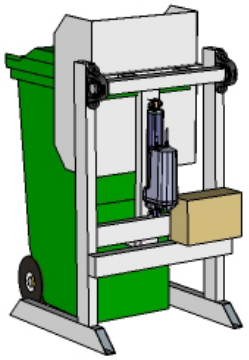
### 3.1 GENERAL DESCRIPTION

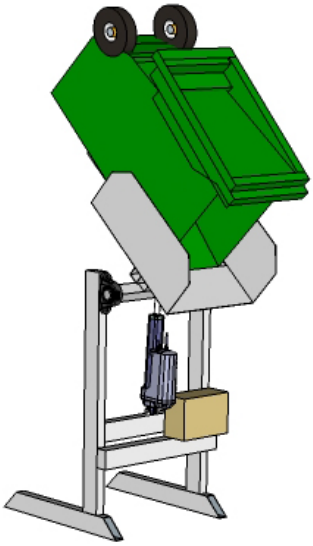
| | |
|---|---|
| Capacity | 100 kg |
| Electricity | 230 volt |
| Ampere | 10 |

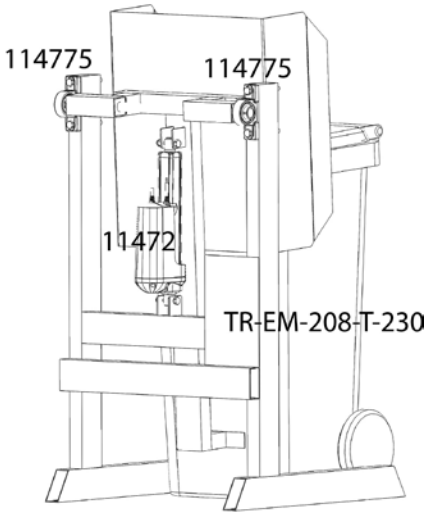
The machinery can be divided in two parts, mechanical and electrical.

### 3.2 MECHANICAL MACHINERY

The bin tipper is essentially a stand with a moving emptying part. The stand is manufactured in RHS bars. The emptying part is manufactured in steel plate and RHS bars.



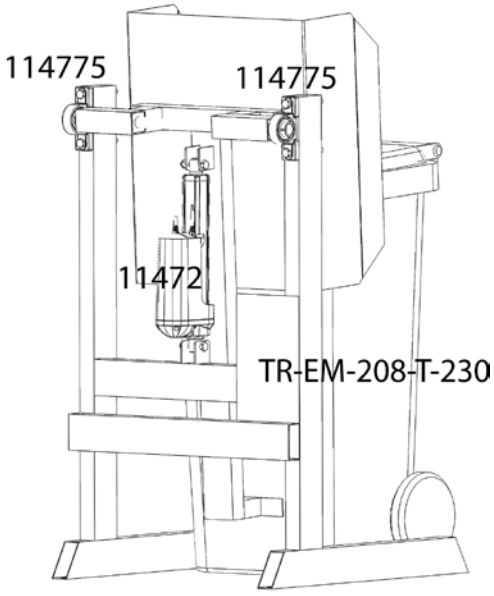





| *Art. Nr* | *Name* |
|---|---|
| *114775* | *Bearing bracket* |

## 3.3 ELECTRICAL MACHINERY

Standard supply voltage is 230 volt. Manoeuvre with two-hand device - ”dead man’s grip”.


| *Art. Nr* | *Name* |
|---|---|
| *11472* | *Bin tipper motor - Actuator* |
| *TR-EM-208-T-230* | *Starter and current limit* |

# 4 INSTALLATION WITH BIG HANNA COMPOSTER

## 4.1 SAFETY

**⚠ INSTALLATION MUST ONLY BE MADE BY AUTHORIZED PERSONNEL.**

## 4.2 INSTALLATION

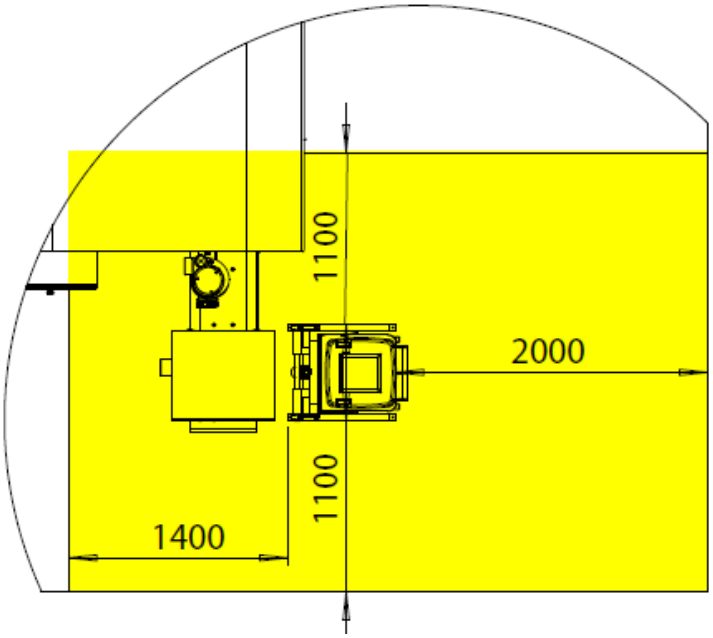
Connect the electricity, turn the key switch towards 'UP' and press the 'START' button.

Lift the bin lift over the hopper of the Big Hanna Composter so that it is free from all edges but close to the hoppers edge closest to the bin lift.

Mark where the holes for the anchor bolts should be drilled.

The bin lift is anchored in the floor with expander bolt (4pcs. 8X100 mm).

Mark the risk area around the lift using yellow paint.




# 5 OPERATION

## 5.1 OPERATION WHEN EMPTYING


Place the bin in the bin lift.
The operator lifts the actuator from its holder and places him/herself outside the risk area. (The risk area shall be clearly marked on the floor around the bin lift, see drawing in appendix 1.)
Turn the key switch towards the mark 'UP' and press the 'START' button.
Let the bin lift do the emptying movement.
After, turn the key switch towards the mark 'DOWN' and press the 'START' button.

# 6 MAINTENANCE AND SERVICE

## 6.1 GENERAL INFORMATION

Regular maintenance and service is very important to avoid breakdowns. In case of lack of maintenance and service Susteco AB takes no responsibility for the consequences hereof.

The owner shall ensure that all employees are informed on how the bin tipper is operated and the risks involved with incorrect use.

When performing maintenance and service it is important that the safety of the personnel can be guaranteed.

**⚠ THE POWER SUPPLY MUST BE SWITCHED OFF AT THE MASTER SWITCH AND LOCKED BEFORE REPAIRING OR SERVICING THE BIN TIPPER.**

**⚠ THE BIN TIPPER SHALL BE IN 'DOWN' POSITION WITHOUT LOAD DURING SERVICE AND MAINTENANCE.**

**⚠ CONTROL OVER THE RISK AREA SHOULD BE MAINTAINED SO THAT NO UNAUTHORISED PERSONS ARE ADJACENT TO THE BIN TIPPER DURING SERVICE AND MAINTENANCE.**

## 6.2 NAMEPLATE FOR BIN TIPPER

The nameplate is positioned on the bin tipper's stand. The nameplate declares the number for one unique bin tipper and is therefore very important in regards to traceability for spare parts.

## 6.3 MAINTENANCE AND SERVICING SCHEDULE

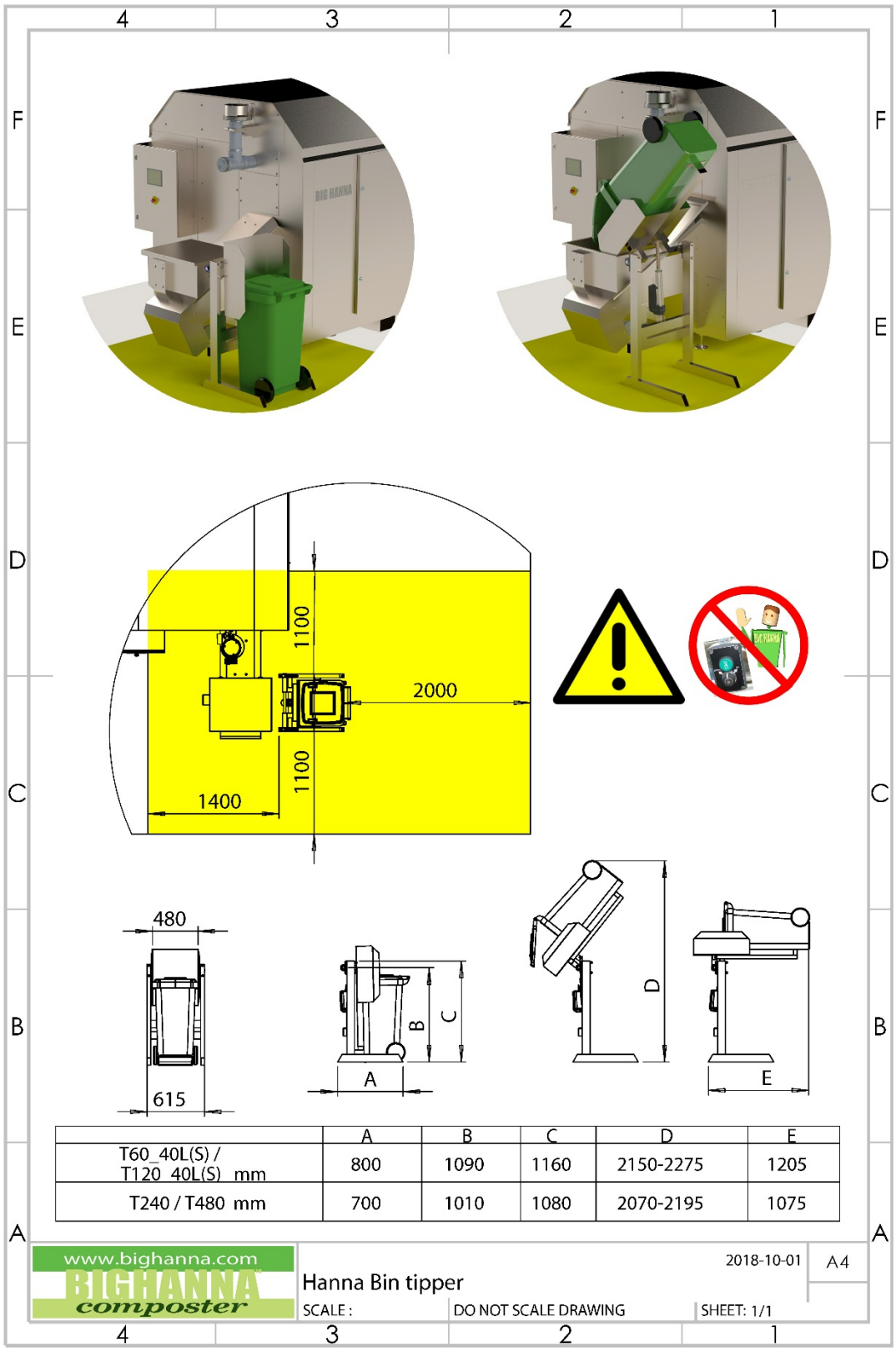
| DETAIL | MEASURE |
|---|---|
| FOREIGN OBJECTS | Look for foreign objects in the equipment. When removing a foreign object make sure electricity is turned off. |
| CABLES | Make sure that no cables are loose or pinched. If this is the case contact authorised personnel. |
| FIRMLY ESTABLISHED | Check that the bin tipper is firmly fixed to the floor. |
| AXLES AND BEARINGS | Check that there is no abnormal play in axles, shafts and bearings. Grease the bearings every 6 months. |
| ACUTATOR | The actuator must be cleaned at regular intervals to remove dust and dirt and inspected for mechanical damages or wear.<br>✓ Inspect attachment points, wires, piston rod, cabinet, and plug, as well as check that the actuator functions correctly.<br>✓The actuator is a closed unit and requires no internal maintenance.<br>✓ To ensure that the pregreased inner tube remains lubricated, the actuator must only be washed down when the piston rod is fully retracted. |

## 6.4 TROUBLE SHOOTING

| SYMPTOM | POSSIBLE CAUSE | ACTION |
|---|---|---|
| No motor sound or movement of piston rod | ✓ The actuator is not connected to the power supply<br>✓ Cable damaged | ✓ Connect the actuator to the power supply<br>✓ Change cable<br>✓ Send actuator for repair |
| Excessive electricity consumption | ✓ Misalignment or overload in application | ✓ Align or reduce load<br>✓ Send actuator for repair |
| Motor runs but spindle does not move | ✓ Gearwheel or spindle damaged | ✓ Send actuator for repair |
| Actuator cannot lift full load | ✓ Clutch is worn<br>✓ Motor is damaged | ✓ Send actuator for repair |
| No signal from potentiometer or hall effect sensor | ✓ Cable damaged<br>✓ Potentiometer damaged | ✓ Change cable<br>✓ Send actuator for repair |
| Motor runs too slowly or does not give full force | ✓ Insufficient power supply<br>✓ Voltage drop in cable | ✓ Increase power supply<br>✓ Thicker cable |
| Actuator cannot hold the chosen load | ✓ Load is higher than specified | ✓ Reduce load |

Contact Susteco AB for assistance in finding faults and repairs if there are any uncertainties.

# 7 APPENDIX 1 - DIMENSIONS




| | A | B | C | D | E |
|---|---|---|---|---|---|
| T60_40L(S) / T120_40L(S) mm | 800 | 1090 | 1160 | 2150-2275 | 1205 |
| T240 / T480 mm | 700 | 1010 | 1080 | 2070-2195 | 1075 |

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Hanna Bin tipper

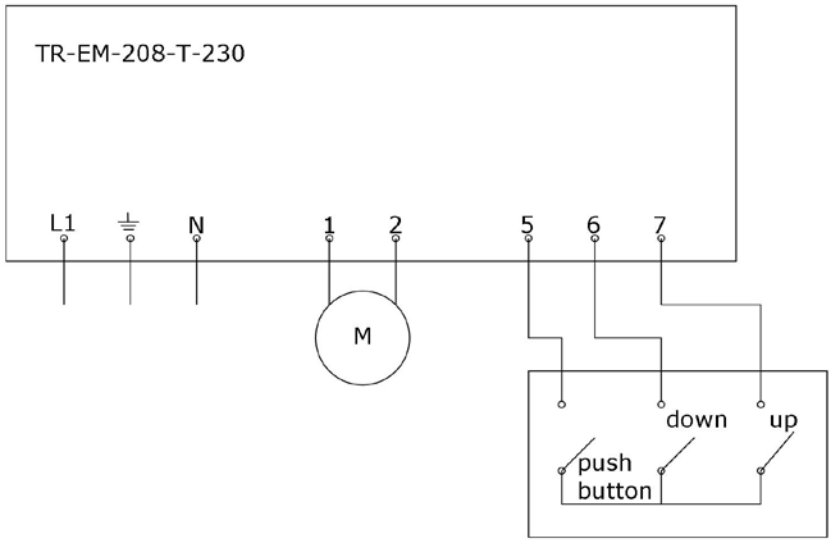
2018-10-01 A4

SCALE : DO NOT SCALE DRAWING SHEET: 1/1

# 8 APPENDIX 2 – ELECTRICAL DRAWING

Hanna Binlift

Electrical schedule
Date: 2013-09-01




Motor: Linak LA36
Starter and current limit: TR-EM-208-T-230

Manoeuvre with key switch and push button "dead mans grip":
SCHNEIDER ELECTRIC / TELEMECANIQUE
XAL-D02 - ENCLOSURE P/B, 2HOLE
ZB5AD501 - white selector switch head Ø22 3-position spring return
ZB5AA333 - HEAD, PUSHBUTTON, 22MM, GREEN, START
ZEN-L1111 - CONTACT BLOCK, 1NO, SCREW

# 9 APPENDIX 3 –SPECIFICATION ACTUATOR LA 36

TECHLINE
IMPROVING FLEXIBILITY

# Actuator LA36
## User manual

LINAK.COM/TECHLINE

LINAK®
WE IMPROVE YOUR LIFE

# Contents

# Contents

# 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.

## IECEx/ATEX

The IECEx/ATEX certified LA36 (optional) is designed for installation in dust filled atmospheres such as grain handling facilities, cement plants, saw mills or other dusty surroundings. Please note that the IECEx/ATEX approval is only for dust, and NOT for gas.

The IECEx/ATEX versions are suitable for applications in Group IIIC, Category 2D. Zone 21 and 22.

### Warnings

**If the following is <u>not</u> complied with, the IECEx/ATEX certification will <u>not</u> be valid:**

- Actuator specifications must be complied with
- If the actuator has no built-in current cut-off, one must be mounted
- Only IECEx/ATEX approved cables are to be used *
- The power supply/signal cables for the actuator must be terminated in a safe location or alternatively by use of an Ex terminal box certified for special conditions for safe use

**Operation of the device is only valid if:**

- The product is used under the conditions described in the installation - and operation instruction
- Ambient operating temperature -25°C to +65°C depending on duty cycle
- Atmospheric conditions: Pressure 80 kPa (0.8 bar) to 110 kPa (1.1 bar); and air with normal oxygen content, typically 21% v/v
- Since the signal and power cables are not UV resistant they need to be shielded against UV light, e.g. daylight or light from luminaries
- The connection between the actuator and the rest of the machine/device shall be conductive, and furthermore the application shall be grounded in order to remove any Electro Static Discharge. This counts for both of the actuator's fixation points (Back Fixture and Piston Rod Eye)
- Safety and operation instructions are accessible and followed
- Not to be opened in areas with dust, and never by unauthorized personnel
- The production of IECEx/ATEX actuators require quality management systems and auditing. Therefore, only LINAK A/S is allowed to produce, modify or repair actuators in order to sustain the approval. No changes are to be made on the actuator after delivery

This manual is part of the equipment. The manufacturer keeps the right to modify specifications without advanced notice. Keep this manual for later use.

*

| LA36 IECEx/ATEX cable item no. | Length (mm) outside the actuator |
|---|---|
| 0367114 - 5000 | Customised lenth - up to 5m |
| 0367115 - 5000 | Customised lenth - up to 5m |

## IECEx/ATEX

**General indication of risk:**

Installation of the device shall be performed by trained staff only, familiar with the safety requirements and risks. Check all relevant safety regulations and technical indications for the specific installation place.
Prevent failures and protect persons against injuries and the device against damage.

The person responsible for the system must secure that:

- Safety and operation instructions are accessible and followed
- Local safety regulations and standards are obeyed
- Performance data and installation specifications are regarded
- Safety devices are installed and recommended maintenance is performed
- National regulations for disposal of electrical equipment are obeyed

Maintenance and repair

- Repairs on the device must be carried out by LINAK authorized persons only
- Only perform mounting described in this manual

During maintenance regard all safety regulations and internal operation instructions.

# 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.

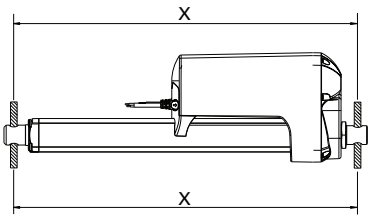
The load should act along the stroke axis of the actuator since off centre loads may cause bending and lead to premature failure. See Figure 2.

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



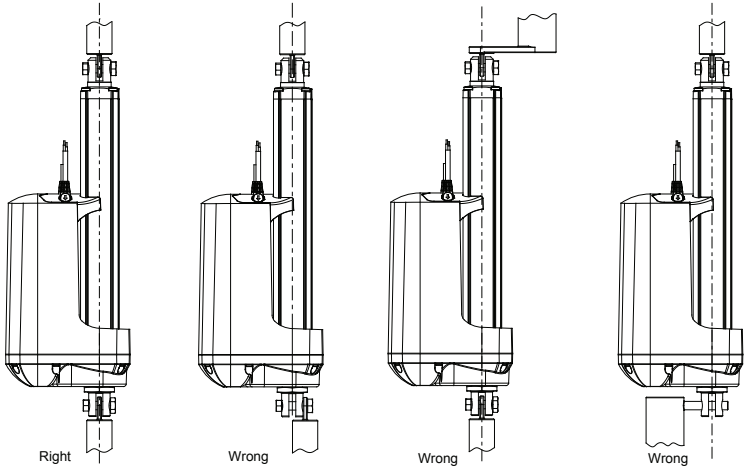




Figure 2

Please be aware that if the LA36 is used for solar applications the actuator must be mounted with the motor housing turned upwards and the wires pointing downwards.

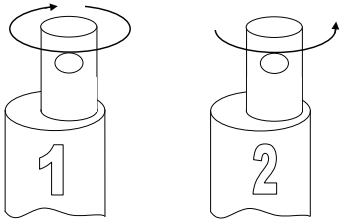
## Mounting guidelines

- 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 the 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 and inner tube:**

- 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).
- As the piston rod eye can turn freely, it is important to ensure that the eye cannot rotate if the actuator is used in a pull application. If this happens, the actuator will be pulled apart and destroyed.

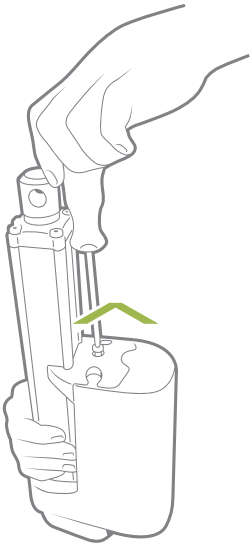



**Warning!**
**If the actuator is used for pull in an application where personal injury can occur, the following is valid:**
It is the application manufacturer's responsibility to incorporate a suitable safety arrangement, which will prevent personal injury from occurring, if the actuator should fail.

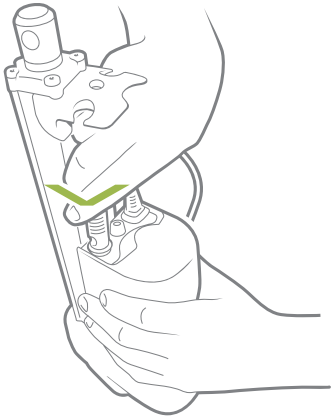
**Warning!**
**LINAK's actuators are not designed for use within the following fields:**

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

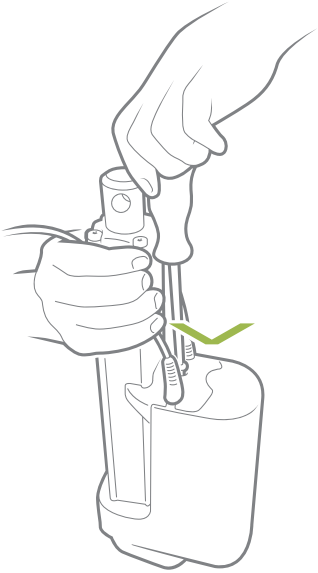
## Mounting of cables



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

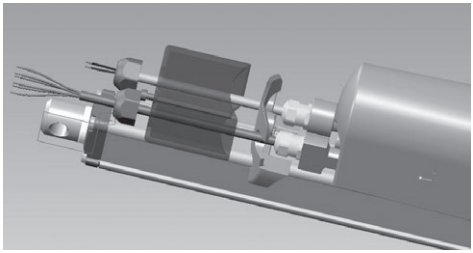
   TORX 25IP

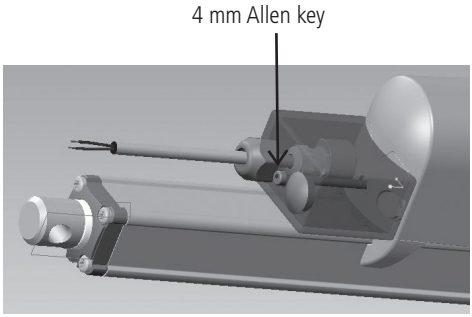
When changing the cables on a LINAK actuator, it is important that this is done carefully, in order to protect the plugs and pins. Before the new cable is mounted, we recommend that the socket is greased with vaseline, to keep the high IP protection and ensure an easy mounting. Please be sure that the 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.
Also note that the cables should not be used for carrying the actuator.

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.

## Mounting of cables with gland cover






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

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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.
Also note that the cables should not be used for carrying the actuator.

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.

**Cable conduits for an LA36 IECEx/ATEX actuator must be ordered separately, if needed.**

**To order a cable conduits kit, please choose one of the following item numbers:**

Item number 0368536-00
(compatible with one cable)

The kit contains:

1 Cable gland cover
1 Gland nut: M20 x 1.5 (for 3/8" conduit)
1 Screw: DIN 912 M5 x 65
1 Blind plug: M20 x 1.5

Item number 0368535-00
(compatible with two cables)

The kit contains:

1 Cable gland cover
2 Gland nuts: M20 x 1.5 (for 3/8" conduit)
1 Screw: DIN 912 M5 x 65

## Electrical installation

- To ensure maximum self-locking ability, please be sure that the motor is shorted when stopped. Actuators with integrated controller provide this feature, as long as the actuator is powered.
- 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 current overload.

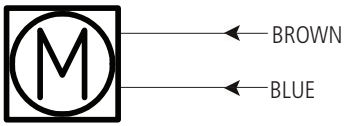
## Recommended fuse for actuators without integrated controller

| 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 | - | - | 40.0 |
| 36120xxxxxxAxxxxF... | 12 | 2600 | - | - | 21.0 | - | - | 40.0 |
| 36120xxxxxxAxxxxG... | 12 | 4500 | - | - | 20.7 | - | - | 40.4 |
| 36120xxxxxxAxxxxH... | 12 | 6800 | - | - | 21.0 | - | - | 40.0 |
| 36200xxxxxxAxxxxF... | 20 | 1700 | - | - | 22.0 | - | - | 40.0 |
| 36200xxxxxxAxxxxE... | 20 | 500 | - | - | 20.0 | - | - | 40.0 |
| 36080xxxxxxBxxxxH... | 8 | 1000 | - | 10.4 | - | - | 20.0 | - |
| 36120xxxxxxBxxxxF... | 12 | 2600 | - | 10.4 | - | - | 20.0 | - |
| 36120xxxxxxBxxxxG... | 12 | 4500 | - | 10.2 | - | - | 20.0 | - |
| 36120xxxxxxBxxxxH... | 12 | 6800 | - | 10.3 | - | - | 20.0 | - |
| 36200xxxxxxBxxxxF... | 20 | 1700 | - | 10.3 | - | - | 20.0 | - |
| 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



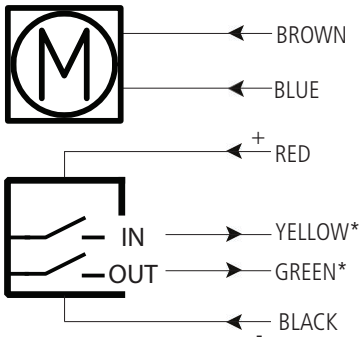

## I/O specifications:

| Input/Output | Specification | Comments |
|---|---|---|
| Description | Permanent magnetic DC motor.<br>See connection diagram, fig. 1 above |  |
| Brown | 12, 24 or 36VDC (+/-)<br>12V ± 20%<br>24V ± 10%<br>36V ± 10% | To extend actuator:<br>Connect Brown to positive<br>To retract actuator:<br>Connect Brown to negative |
| Blue | Under normal conditions:<br>12V, max. 26A depending on load<br>24V, max. 13A depending on load<br>36V, max. 10A depending on load | To extend actuator:<br>Connect Blue to negative<br>To retract actuator:<br>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

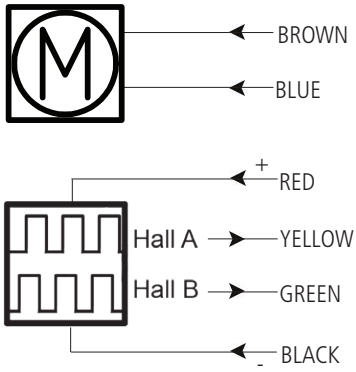
## I/O specifications:

| Input/Output | Specification | Comments |
|---|---|---|
| Description | The actuator can be equipped with electronically controlled endstop signals out.<br>See connection diagram, fig. 2 on page 17 |  |
| Brown | 12, 24 or 36VDC (+/-)<br>12V ± 20%<br>24V ± 10%<br>36V ± 10% | To extend actuator:<br>Connect Brown to positive<br>To retract actuator:<br>Connect Brown to negative |
| Blue | Under normal conditions:<br>12V, max. 26A depending on load<br>24V, max. 13A depending on load<br>36V, max. 10A depending on load | To extend actuator:<br>Connect Blue to negative<br>To retract actuator:<br>Connect Blue to positive |
| Red | Signal power supply (+)<br>12-24VDC | Current consumption:<br>Max. 40mA, also when the actuator is not running |
| Black | Signal power supply GND (-) | |
| Green | Endstop signal out | Output voltage min. $V_{IN}$ - 2V<br>Source current max. 100mA<br>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:

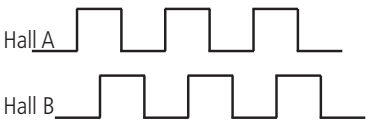
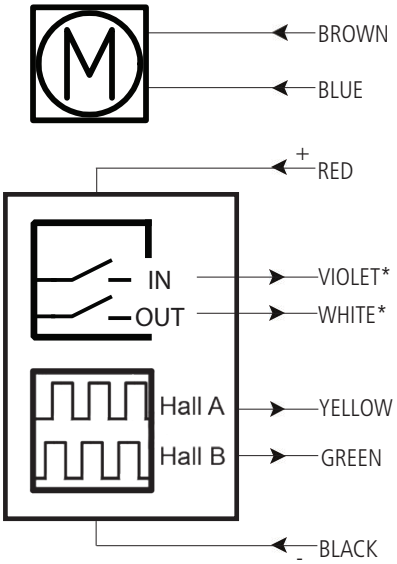
<table>
<tr><th>Input/Output</th><th colspan="2">Specification</th><th>Comments</th></tr>
<tr><td>Description</td><td colspan="2">The actuator can be equipped with Dual Hall that gives a relative positioning feedback signal when the actuator moves.<br>See connection diagram, fig. 3, page 19</td><td> 
</td></tr>
<tr><td>Brown</td><td colspan="2" rowspan="2">12, 24 or 36VDC (+/-)<br>12V ± 20%<br>24V ± 10%<br>36V ± 10%<br>Under normal conditions:<br>12V, max. 26A depending on load<br>24V, max. 13A depending on load<br>36V, max. 10A depending on load</td><td>To extend actuator:<br>Connect Brown to positive<br>To retract actuator:<br>Connect Brown to negative</td></tr>
<tr><td>Blue</td><td>To extend actuator:<br>Connect Blue to negative<br>To retract actuator:<br>Connect Blue to positive</td></tr>
<tr><td>Red</td><td colspan="2">Signal power supply (+)<br>12-24VDC</td><td rowspan="2">Current consumption:<br>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:<br>LA362C Actuator = 0.4 mm per pulse<br>LA363C Actuator = 0.7 mm per pulse<br>LA363B Actuator = 1.0 mm per pulse<br>LA363A Actuator = 1.7 mm per pulse<br>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.<br>Output voltage min. $V_{IN}$ - 1V<br>Current output 12mA<br>Overvoltage on the motor can result in shorter pulses.<br>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:

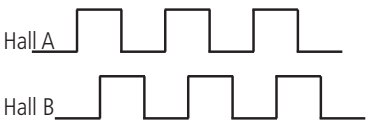
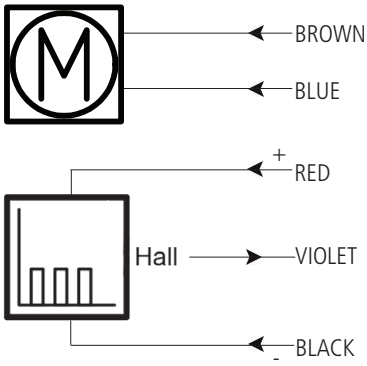
<table>
<tr><th>Input/Output</th><th colspan="2">Specification</th><th>Comments</th></tr>
<tr><td>Description</td><td colspan="2">The actuator can be equipped with Dual Hall that gives a relative positioning feedback signal when the actuator moves.<br>See connection diagram, fig. 4, page 21</td><td> 
</td></tr>
<tr><td>Brown</td><td colspan="2" rowspan="2">12, 24 or 36VDC (+/-)<br>12V ± 20%<br>24V ± 10%<br>36V ± 10%<br><br>Under normal conditions:<br>12V, max. 26A depending on load<br>24V, max. 13A depending on load<br>36V, max. 10A depending on load</td><td>To extend actuator:<br>Connect Brown to positive<br>To retract actuator:<br>Connect Brown to negative</td></tr>
<tr><td>Blue</td><td>To extend actuator:<br>Connect Blue to negative<br>To retract actuator:<br>Connect Blue to positive</td></tr>
<tr><td>Red</td><td colspan="2">Signal power supply (+)<br>12-24VDC</td><td rowspan="2">Current consumption:<br>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:<br>LA362C Actuator = 0.4 mm per pulse<br>LA363C Actuator = 0.7 mm per pulse<br>LA363B Actuator = 1.0 mm per pulse<br>LA363A Actuator = 1.7 mm per pulse<br>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.<br>Output voltage min. $V_{IN}$ - 1V<br>Current output 12mA<br>Overvoltage on the motor can result in shorter pulses.<br>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<br>Source current max. 30mA<br>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:

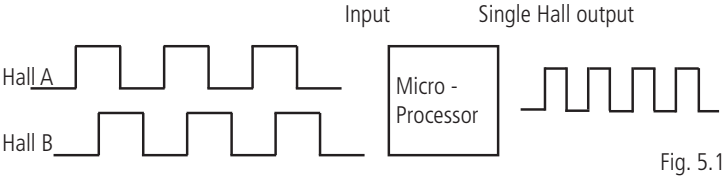
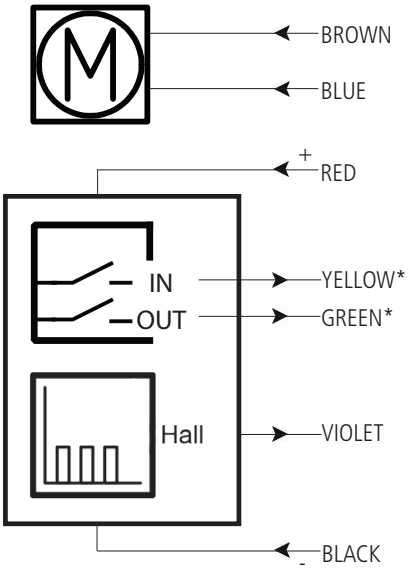
<table>
<tr><th>Input/Output</th><th>Specification</th><th>Comments</th></tr>
<tr><td>Description</td><td>The actuator can be equipped with Single Hall that gives a relative positioning feedback signal when the actuator moves.<br><br>See connection diagram,<br>fig. 5, page 23</td><td> 
</td></tr>
<tr><td>Brown</td><td rowspan="2">12, 24 or 36VDC (+/-)<br><br>12V ± 20%<br>24V ± 10%<br>36V ± 10%<br><br>Under normal conditions:<br>12V, max. 26A depending on load<br>24V, max. 13A depending on load<br>36V, max. 10A depending on load</td><td>To extend actuator:<br>Connect Brown to positive<br><br>To retract actuator:<br>Connect Brown to negative</td></tr>
<tr><td>Blue</td><td>To extend actuator:<br>Connect Blue to negative<br><br>To retract actuator:<br>Connect Blue to positive</td></tr>
<tr><td>Red</td><td>Signal power supply (+)<br>12-24VDC</td><td rowspan="2">Current consumption:<br>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)<br><br>Movement per Single Hall pulse:<br>LA362C: Actuator = 0.1 mm per pulse<br>LA363C: Actuator = 0.2 mm per pulse<br>LA363B: Actuator = 0.3 mm per pulse<br>LA363A: Actuator = 0.4 mm per pulse<br>LA365A: Actuator = 0.7 mm per pulse<br><br>Frequency:<br>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<br>Max. current output: 12mA<br>Max. 680nF<br><br>N.B. For more precise measurements, please contact<br>LINAK A/S.<br><br>Low frequency with a high load.Higher frequency with no load.</td></tr>
<tr><td colspan="2">Diagram of Single Hall:<br> 

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:

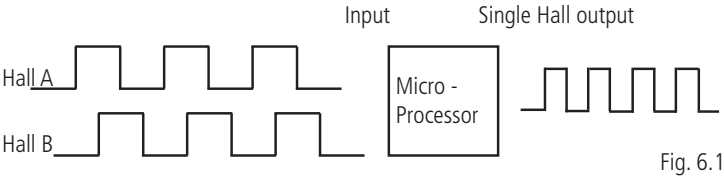
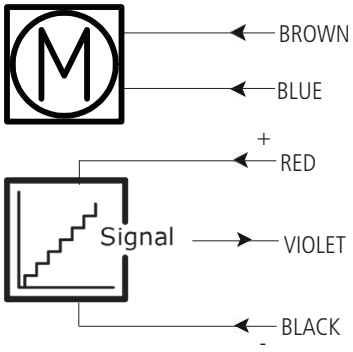
<table>
<tr><th>Input/Output</th><th>Specification</th><th>Comments</th></tr>
<tr><td>Description</td><td>The actuator can be equipped with Single Hall that gives a relative positioning feedback signal when the actuator moves.<br>See connection diagram, fig. 6, page 25</td><td> 
</td></tr>
<tr><td>Brown</td><td rowspan="2">12, 24 or 36VDC (+/-)<br>12V ± 20%<br>24V ± 10%<br>36V ± 10%<br><br>Under normal conditions:<br>12V, max. 26A depending on load<br>24V, max. 13A depending on load<br>36V, max. 10A depending on load</td><td>To extend actuator:<br>Connect Brown to positive<br>To retract actuator:<br>Connect Brown to negative</td></tr>
<tr><td>Blue</td><td>To extend actuator:<br>Connect Blue to negative<br>To retract actuator:<br>Connect Blue to positive</td></tr>
<tr><td>Red</td><td>Signal power supply (+)<br>12-24VDC</td><td rowspan="2">Current consumption:<br>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>Endstop signal out</td><td rowspan="2">Output voltage min. $V_{IN}$ - 2V<br>Source current max. 100mA<br>NOT potential free</td></tr>
<tr><td>Yellow</td><td>Endstop signal in</td></tr>
<tr><td rowspan="2">Violet</td><td>Single Hall output (PNP)<br>Movement per Single Hall pulse:<br>LA362C: Actuator = 0.1 mm per pulse<br>LA363C: Actuator = 0.2 mm per pulse<br>LA363B: Actuator = 0.3 mm per pulse<br>LA363A: Actuator = 0.4 mm per pulse<br>LA365A: Actuator = 0.7 mm per pulse<br>Frequency:<br>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<br>Max. current output: 12mA<br>Max. 680nF<br>N.B. For more precise measurements, please contact LINAK A/S.<br>Low frequency with a high load.Higher frequency with no load.</td></tr>
<tr><td colspan="2">Diagram of Single Hall:<br> 

Fig. 6.1</td></tr>
<tr><td>White</td><td colspan="2">Not to be connected</td></tr>
</table>

## 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:

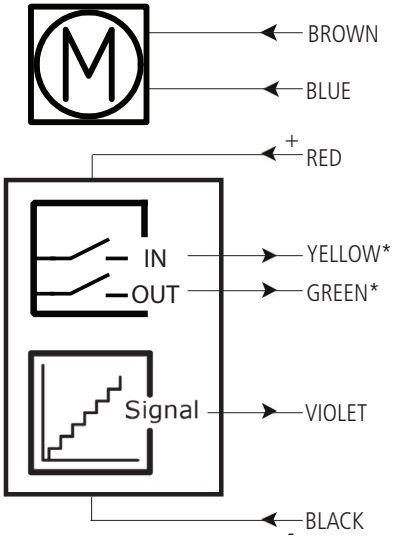
| Input/Output | Specification | Comments |
|---|---|---|
| Description | The actuator can be equipped with electronic circuit that gives an analogue feedback signal when the actuator moves.<br>See connection diagram, fig. 7, page 27 |  |
| Brown | 12, 24 or 36VDC (+/-)<br>12V ± 20%<br>24V ± 10%<br>36V ± 10% | To extend actuator:<br>Connect Brown to positive<br>To retract actuator:<br>Connect Brown to negative |
| Blue | Under normal conditions:<br>12V, max. 26A depending on load<br>24V, max. 13A depending on load<br>36V, max. 10A depending on load | To extend actuator:<br>Connect Blue to negative<br>To retract actuator:<br>Connect Blue to positive |
| Red | Signal power supply (+)<br>12-24VDC | Current consumption:<br>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<br>0-10V (Option B)<br>0.5-4.5V (Option C) | Tolerances +/- 0.2V<br>Max. current output: 1mA<br>Ripple max. 200mV<br>Transaction delay 100ms<br>Linear feedback 0.5%<br>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 | |

It is recommended that the actuator activates its limit switches on a regular basis, to ensure more precise positioning. The actuator can also go into the position lost state. When the actuator goes in position lost state, the feedback level will remain the highest level until the actuator is initiated. For instance, if feedback is 0-10 V, the feedback level will remain 10V until the actuator is initialised. Both physical end stop switches need to be activated for correct initialisation of the feedback. There is no rule as to which one needs to be activated first.

## 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:

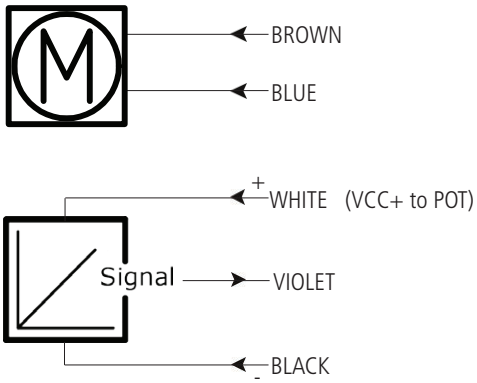
| Input/Output | Specification | Comments |
|---|---|---|
| Description | The actuator can be equipped with electronic circuit that gives an analogue feedback signal when the actuator moves.<br>See connection diagram, fig. 8, page 29 |  |
| Brown | 12, 24 or 36VDC (+/-)<br>12V ± 20%<br>24V ± 10%<br>36V ± 10% | To extend actuator:<br>Connect Brown to positive<br>To retract actuator:<br>Connect Brown to negative |
| Blue | Under normal conditions:<br>12V, max. 26A depending on load<br>24V, max. 13A depending on load<br>36V, max. 10A depending on load | To extend actuator:<br>Connect Blue to negative<br>To retract actuator:<br>Connect Blue to positive |
| Red | Signal power supply (+)<br>12-24VDC | Current consumption:<br>Max. 60mA, also when the actuator is not running |
| Black | Signal power supply GND (-) | |
| Green | Endstop signal out | Output voltage min. $V_{IN}$ - 2V<br>Source current max. 100mA<br>NOT potential free |
| Yellow | Endstop signal in | |
| Violet | Analogue feedback<br>0-10V (Option B)<br>0.5-4.5V (Option C) | Tolerances +/- 0.2V<br>Max. current output: 1mA<br>Ripple max. 200mV<br>Transaction delay 20ms<br>Linear feedback 0.5%<br>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 | |

It is recommended that the actuator activates its limit switches on a regular basis, to ensure more precise positioning. The actuator can also go into the position lost state. When the actuator goes in position lost state, the feedback level will remain the highest level until the actuator is initiated. For instance, if feedback is 0-10 V, the feedback level will remain 10V until the actuator is initialised. Both physical end stop switches need to be activated for correct initialisation of the feedback. There is no rule as to which one needs to be activated first.

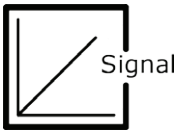
## Actuator with absolute positioning - Mechanical potentiometer feedback

### Connection diagram:

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



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

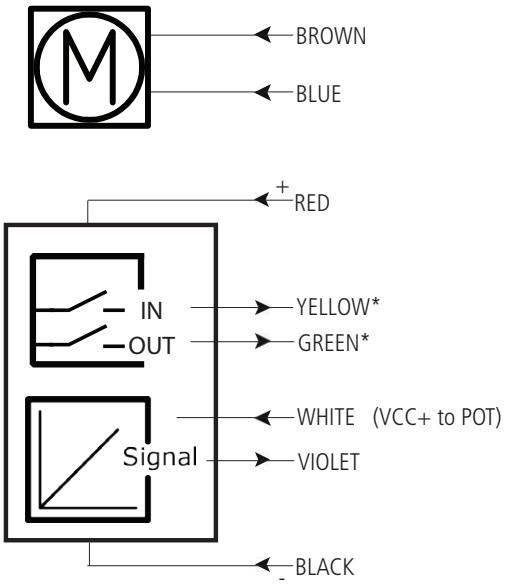
| Input/Output | Specification | Comments |
|---|---|---|
| Description | The actuator can be equipped with a mechanical potentiometer, 10 kohm.<br>See connection diagram, fig. 9, page 31 |  <br>Bourns 0-10 kohm, 5%, 10-Turn<br>Type: 3540 Wirewound |
| Brown | 12, 24 or 36VDC (+/-)<br>12V ± 20%<br>24V ± 10%<br>36V ± 10% | To extend actuator:<br>Connect Brown to positive<br>To retract actuator:<br>Connect Brown to negative |
| Blue | Under normal conditions:<br>12V, max. 26A depending on load<br>24V, max. 13A depending on load<br>36V, max. 10A depending on load | To extend actuator:<br>Connect Blue to negative<br>To retract actuator:<br>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<br>Output range with 8mm spindle pitch:<br>0 kohm = 0mm stroke<br>10 kohm = 333mm stroke<br>Output range with 12mm spindle pitch:<br>0 kohm = 0mm stroke<br>10 kohm = 500mm stroke<br>Output range with 20mm spindle pitch:<br>0 kohm = 0mm stroke<br>10 kohm = 833mm stroke | +10V or other value<br>Output protection:<br>1 kohm protection resistor<br>Linearity: ± 0.25% |
| White | VCC+ to POT<br>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:

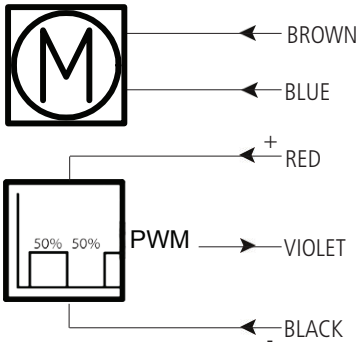
| Input/Output | Specification | Comments |
|---|---|---|
| Description | The actuator can be equipped with a mechanical potentiometer, 10 kohm.<br>See connection diagram, fig. 10, page 33 |  <br>Bourns 0-10 kohm, 5%, 10-Turn<br>Type: 3540 Wirewound |
| Brown | 12, 24 or 36VDC (+/-)<br>12V ± 20%<br>24V ± 10%<br>36V ± 10% | To extend actuator:<br>Connect Brown to positive<br>To retract actuator:<br>Connect Brown to negative |
| Blue | Under normal conditions:<br>12V, max. 26A depending on load<br>24V, max. 13A depending on load<br>36V, max. 10A depending on load | To extend actuator:<br>Connect Blue to negative<br>To retract actuator:<br>Connect Blue to positive |
| Red | Signal power supply (+)<br>12-24VDC | For endstop signals |
| Black | Signal power supply GND (-) | |
| Green | Endstop signal out | Output voltage min. $V_{IN}$ - 2V<br>Source current max. 100mA<br>NOT potential free |
| Yellow | Endstop signal in | |
| Violet | Mechanical potentiometer output<br>Output range with 8mm spindle pitch:<br>0 kohm = 0mm stroke<br>10 kohm = 333mm stroke<br>Output range with 12mm spindle pitch:<br>0 kohm = 0mm stroke<br>10 kohm = 500mm stroke<br>Output range with 20mm spindle pitch:<br>0 kohm = 0mm stroke<br>10 kohm = 833mm stroke | +10V or other value<br>Output protection:<br>1 kohm protection resistor<br>Linearity: ± 0.25% |
| White | VCC+ to POT<br>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:

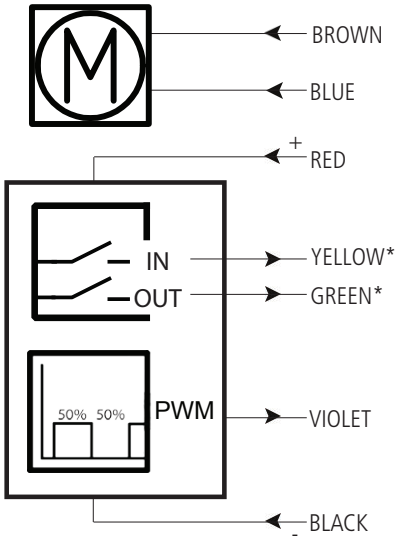
| Input/Output | Specification | Comments |
|---|---|---|
| Description | The actuator can be equipped with electronic circuit that gives an analogue feedback signal when the actuator moves.<br>See connection diagram, fig. 11, page 35 |  |
| Brown | 12, 24 or 36VDC (+/-)<br>12V ± 20%<br>24V ± 10%<br>36V ± 10% | To extend actuator:<br>Connect Brown to positive<br>To retract actuator:<br>Connect Brown to negative |
| Blue | Under normal conditions:<br>12V, max. 26A depending on load<br>24V, max. 13A depending on load<br>36V, max. 10A depending on load | To extend actuator:<br>Connect Blue to negative<br>To retract actuator:<br>Connect Blue to positive |
| Red | Signal power supply (+)<br>12-24VDC | Current consumption:<br>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)<br>10-90% (Option 5)<br>20-80% (Option 6) | Output voltage min. $V_{IN}$ - 2V<br>Tolerances +/- 2%<br>Max. current output: 12mA<br>Frequency: 75Hz<br>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 | |

It is recommended that the actuator activates its limit switches on a regular basis, to ensure more precise positioning. The actuator can also go into the position lost state. When the actuator goes in position lost state, the feedback level will remain the highest level until the actuator is initiated. For instance, if feedback is 0-10 V, the feedback level will remain 10V until the actuator is initialised. Both physical end stop switches need to be activated for correct initialisation of the feedback. There is no rule as to which one needs to be activated first.

## Actuator with endstop signals and absolute positioning - PWM

## Connection diagram:

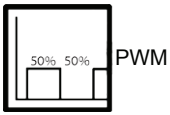
Fig. 12 : 36xxxxx25/26xxxxxx
36xxxxxxxF00xx-xxxxxxxxxxxxxxx




*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:

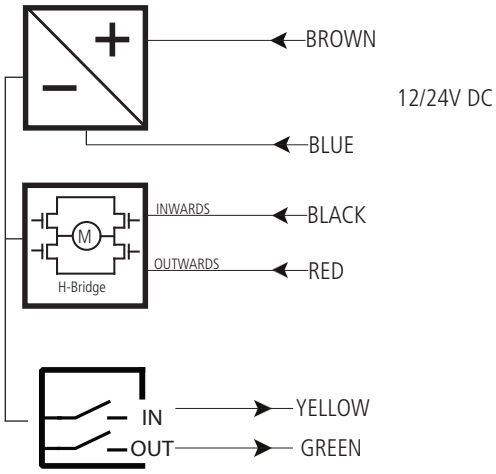
| Input/Output | Specification | Comments |
|---|---|---|
| Description | The actuator can be equipped with electronic circuit that gives an analogue feedback signal when the actuator moves.<br>See connection diagram, fig. 12, page 37 |  |
| Brown | 12, 24 or 36VDC (+/-)<br>12V ± 20%<br>24V ± 10%<br>36V ± 10% | To extend actuator:<br>Connect Brown to positive<br>To retract actuator:<br>Connect Brown to negative |
| Blue | Under normal conditions:<br>12V, max. 26A depending on load<br>24V, max. 13A depending on load<br>36V, max. 10A depending on load | To extend actuator:<br>Connect Blue to negative<br>To retract actuator:<br>Connect Blue to positive |
| Red | Signal power supply (+)<br>12-24VDC | Current consumption:<br>Max. 60mA, also when the actuator is not running |
| Black | Signal power supply GND (-) | |
| Green | Endstop signal out | Output voltage min. $V_{IN}$ - 2V<br>Source current max. 100mA<br>NOT potential free |
| Yellow | Endstop signal in | |
| Violet | Digital output feedback (PNP)<br>10-90% (Option 5)<br>20-80% (Option 6) | Output voltage min. $V_{IN}$ - 2V Tolerances +/- 2%<br>Max. current output: 12mA<br>Frequency: 75Hz<br>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 | |

It is recommended that the actuator activates its limit switches on a regular basis, to ensure more precise positioning. The actuator can also go into the position lost state. When the actuator goes in position lost state, the feedback level will remain the highest level until the actuator is initiated. For instance, if feedback is 0-10 V, the feedback level will remain 10V until the actuator is initialised. Both physical end stop switches need to be activated for correct initialisation of the feedback. There is no rule as to which one needs to be activated first.

## Actuator with IC Basic

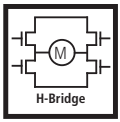
## Connection diagram:

Fig. 13 : 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).<br>The actuator can also be equipped with electronic circuit that gives an absolute or relative feedback signal.<br>The version with "IC option" cannot be operated with PWM (power supply).<br>See connection diagram, fig. 13, page 39 |  |
| Brown | 12-24VDC + (VCC)<br>Connect Brown to positive<br>12V ± 20%<br>24V ± 10%<br>12V, current limit 30A<br>24V, current limit 20A | Note: Do not change the power supply polarity on the brown and blue wires!<br>Power supply GND (-) is electrically connected to the housing<br>If the temperature drops below 0°C, all current limits will automatically increase to 30A |
| Blue | 12-24VDC - (GND)<br>Connect Blue to negative<br>12V ± 20%<br>24V ± 10%<br>12V, current limit 30A<br>24V, current limit 20A | |
| Red | Extends the actuator | On/off voltages:<br>> 67% of $V_{IN}$ = ON<br>< 33% of $V_{IN}$ = OFF<br>Input current: 10mA |
| Black | Retracts the actuator | |
| Green | Not to be connected | |
| Yellow | Not to be connected | |

- Current cut-offs should not be used as stop function! This might damage the actuator. Current cut-offs should only be used in emergencies!
- Current cut-off limits are not proportional with the load curves of the actuator. This means that the current cut-offs cannot be used as load indicator.
- There are tolerances on the spindle, nut, gear wheels etc. and these tolerances will have an influence on the current consumption for the specific actuator.

## Actuator with IC Basic
## I/O specifications:

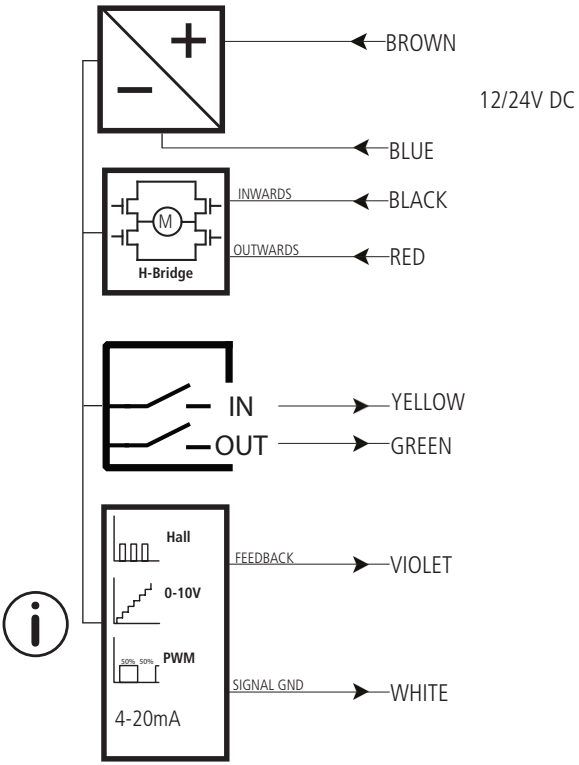
| Input/Output | Specification | Comments |
|---|---|---|
| Violet | Analogue feedback<br>0-10V (Option 7.2) | Standby power consumption:<br>12V, 60mA<br>24V, 45 mA<br>Ripple max. 200mV<br>Transaction delay 20ms<br>Linear feedback 0.5%<br>Max. current output: 1mA<br>It is recommendable to have the actuator to activate its limit switches on a regular basis, to ensure more precise positioning |
| | Single Hall output (PNP) (Option 7.1)<br>Movement per Single Hall pulse:<br>LA362C: Actuator = 0.1 mm per count<br>LA363C: Actuator = 0.2 mm per count<br>LA363B: Actuator = 0.3 mm per count<br>LA363A: Actuator = 0.4 mm per count<br>LA365A: Actuator = 0.7 mm per count<br>Frequency:<br>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<br>Max. current output: 12mA<br>Max. 680nF |
| White | Signal GND | For correct wiring of power GND and Signal GND see page 45 |

It is recommended that the actuator activates its limit switches on a regular basis, to ensure more precise positioning. The actuator can also go into the position lost state. When the actuator goes in position lost state, the feedback level will remain the highest level until the actuator is initiated. For instance, if feedback is 0-10 V, the feedback level will remain 10V until the actuator is initialised. Both physical end stop switches need to be activated for correct initialisation of the feedback. There is no rule as to which one needs to be activated first.

## Actuator with IC Advanced - with BusLink

## Connection diagram:

Fig. 14 : 36xxxxx8xxxxxxx
36xxxxxxxx03xx-xxxxxxxxxxxxxxx




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

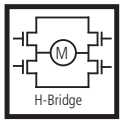
**The BusLink software tool is available for IC Advanced and can be used for:**
Diagnostics, manual run and configuration

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**

Please note that the BusLink cables must be purchased separately from the actuator!
Item number for BusLink cable kit: 0367999 (adaptor + USB2Lin)

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

| Input/Output | Specification | Comments |
|---|---|---|
| Description | Easy to use interface with integrated power electronics (H-bridge).<br>The actuator can also be equipped with electronic circuit that gives an absolute or relative feedback signal.<br>IC Advanced provides a wide range of possibilities for customisation.<br>The version with "IC option" cannot be operated with PWM (power supply).<br>See connection diagram, fig. 14, page 42 |  |
| Brown | 12-24VDC + (VCC)<br>Connect Brown to positive<br>12V ± 20%<br>24V ± 10%<br>12V, current limit 30A<br>24V, current limit 20A | Note: Do not change the power supply polarity on the brown and blue wires!<br>Power supply GND (-) is electrically connected to the housing<br>Current limit levels can be adjusted through BusLink<br>If the temperature drops below 0°C, all current limits will automatically increase to 30A |
| Blue | 12-24VDC - (GND)<br>Connect Blue to negative<br>12V ± 20%<br>24V ± 10%<br>12V, current limit 30A<br>24V, current limit 20A | |
| Red | Extends the actuator | On/off voltages:<br>> 67% of $V_{IN}$ = ON<br>< 33% of $V_{IN}$ = OFF<br>Input current: 10mA<br>Active filter time: reaction time: 52,6 ms before movement |
| Black | Retracts the actuator | |
| Green | Endstop signal out | Output voltage min. $V_{IN}$ - 2V<br>Source current max. 100mA<br>Endstop signals are NOT potential free. Endstop signals can be configured with BusLink software according to any position needed<br>When configuring virtual endstop, it is not necessary to choose the position feedback<br>EOS and virtual endstop will work even when feedback is not chosen |
| Yellow | Endstop signal in | |

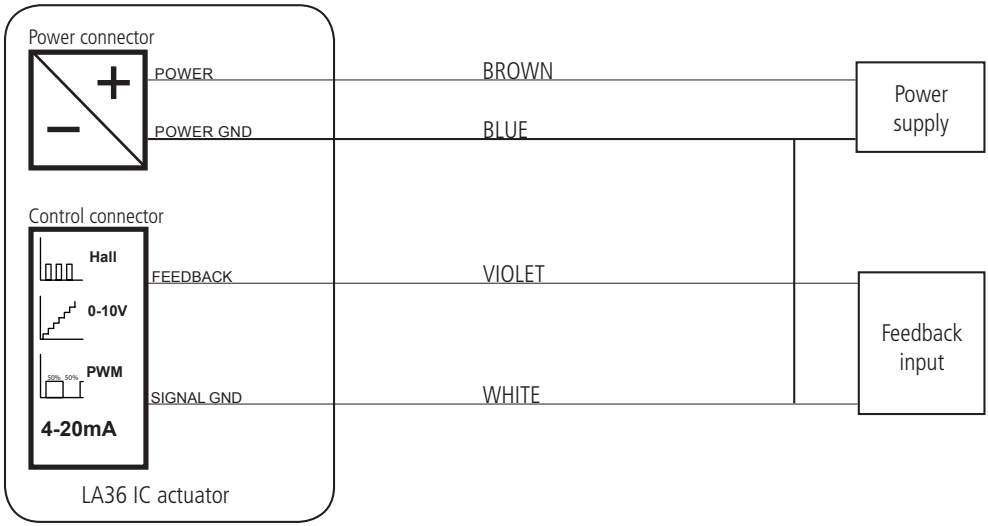
## Actuator with IC Advanced - with BusLink
## I/O specifications:

| Input/Output | Specification | Comments |
|---|---|---|
| Violet | Analogue feedback (0-10V):<br>Configure any high/low combination between 0-10V | Ripple max. 200mV<br>Transaction delay 20ms<br>Linear feedback 0.5%<br>Max. current output. 1mA |
| | Single Hall output (PNP):<br>Movement per Single Hall pulse:<br>LA362C: Actuator = 0.1 mm per count<br>LA363C: Actuator = 0.2 mm per count<br>LA363B: Actuator = 0.3 mm per count<br>LA363A: Actuator = 0.4 mm per count<br>LA365A: Actuator = 0.7 mm per count<br>Frequency:<br>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<br>Max. current output: 12mA<br>Max. 680nF<br>Open collector source current max. 12mA |
| | Digital output feedback PWM:<br>Configure any high/low combination between 0-100% | Output voltage min. $V_{IN}$ - 2V Frequency: 75Hz ± 10Hz as standard, but this can be customised.<br>Duty cycle: Any low/high combination between 0 and 100 percent.<br>Open collector source current max. 12mA |
| | Analogue feedback (4-20mA):<br>Configure any high/low combination between 4-20mA | Tolerances ± 0.2mA<br>Transaction delay 20ms<br>Linear feedback 0.5%<br>Output: Source<br>Serial resistance:<br>12V max. 300 ohm<br>24V max. 900 ohm |
| | All absolute value feedbacks (0-10V, PWM and 4-20mA) | Standby power consumption:<br>12V, 60mA<br>24V, 45mA<br>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 45 |

- Current cut-offs should not be used as stop function! This might damage the actuator. Current cut-offs should only be used in emergencies!
- Current cut-off limits are not proportional with the load curves of the actuator. This means that the current cut-offs cannot be used as load indicator.
- There are tolerances on the spindle, nut, gear wheels etc. and these tolerances will have an influence on the current consumption for the specific actuator.

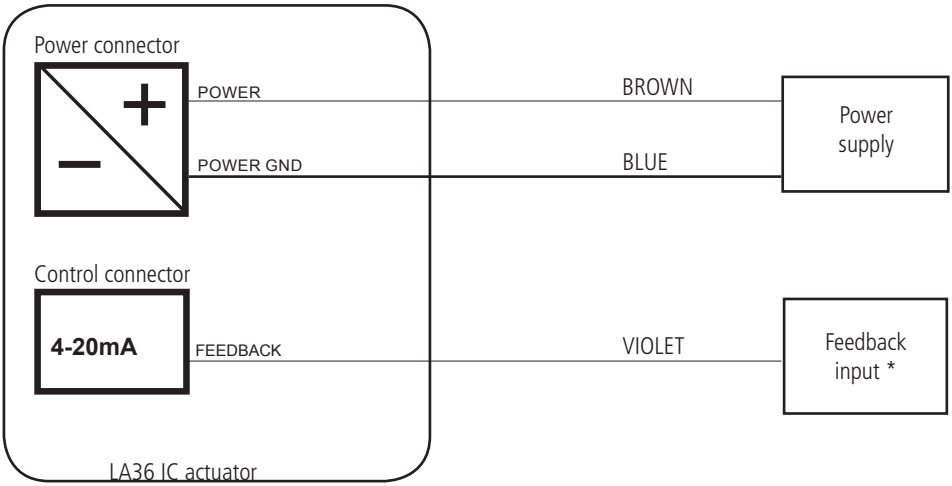
## Correct wiring of Power GND and Signal GND for IC Basic and IC Advanced

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.

**The following connection illustration applies to 4-20mA only:**




* Only to be used on differential input card. Do not use single ended input card.

Do NOT connect or put the white wire anywhere near GND, as this will create ground loops, disturbing the mA-signal.

## IC options overview

| | Basic | Advanced | Parallel | LIN bus | CAN bus |
|---|---|---|---|---|---|
| **Control** | | | | | |
| 12V, 24V supply | √ | √ | √ | √ | √ |
| H-bridge | √ | √ | √ | √ | √ |
| Manual drive in/out | √ | √ | √ | √ | √ |
| EOS in/out | - | √ | √ | √ | - |
| Soft start/stop | √ | √ | √ | √ | √ |
| **Feedback** | | | | | |
| Voltage | √ | √ * | - | - | - |
| Current | - | √ ** | - | - | - |
| Single Hall | √ | √ | - | - | - |
| PWM | - | √ | - | - | - |
| Position (mm) | - | - | - | √ | √ |
| Custom feedback type | - | √ | - | - | - |
| **Monitoring** | | | | | |
| Temperature monitoring | √ | √ | √ | √ | √ |
| Current cut-off | √ | √ | √ | √ | √ |
| Ready signal | - | - | - | - | - |
| BusLink ⟨····⟩ | | | | | |
| Service counter | - | √ | √ | √ | √ |
| Custom soft start/stop | - | √ *** | √ *** | √ *** | √ *** |
| Custom current limit - | √ | √ | √ | √ | √ |
| Speed setting | - | √ | √ | √ | √ |
| Virtual end stop | - | √ | √ | √ | √ |

* Configure any high/low combination between 0 - 10V
** Configure any high/low combination between 4 - 20mA
*** Configure any value between 0 - 30s

## Feedback configurations available for IC Basic, IC Advanced and Parallel

| | Pre-configured | Customised range | Pros | Cons |
|---|---|---|---|---|
| None | | | N/A | N/A |
| PWM Feedback | 10 – 90 %<br>75 Hz | 0 – 100 %<br>75 – 150 Hz | Suitable for long distance transmission.<br>Effectual immunity to electrical noise. | More complex processing required, compared to AFV and AFC. |
| Single Hall* | N/A | N/A | Suitable for long distance transmission. | No position indication. |
| Analogue Feedback Voltage (AFV)* | 0 - 10V | Any combination, going negative or positive.<br>E.g. 8.5 – 2.2V over a full stroke. | High resolution. Traditional type of feedback suitable for most PLCs.<br>Easy faultfinding.<br>Independent on stroke length, compared to a traditional mechanical potentiometer. | Not recommended for applications with long distance cables or environments exposed to electrical noise. |
| Analogue Feedback Current (AFC) | 4 - 20mA | Any combination, going negative or positive.<br>E.g. 5.5 – 18mA over a full stroke. | High resolution. Better immunity to long cables and differences in potentials than AFV.<br>Provides inherent error condition detection.<br>Independent on stroke length, compared to a traditional mechanical potentiometer. | Not suitable for signal isolation. Only to be used on differential input card. Do not use single ended input card.<br>Do NOT connect or put the white wire anywhere near GND, as this will create ground loops, disturbing the mA-signal. |
| Endstop signal in/out** | At physical end stops.<br>Default for IC Advanced. | Any position.<br>(Not IC Basic) | Can be set at any position over the full stroke length.<br>(Not IC Basic) | Only one endstop can be customised.<br>(Not IC Basic) |

All feedback configurations are available for IC Advanced.
* IC Basic feedback configurations available: EOS
** Parallel feedback configurations available: EOS

## Actuator configurations available for IC Basic, IC Advanced and Parallel

| | Pre-configured | Customised range (Not IC Basic) | Description |
|---|---|---|---|
| Current limit inwards<br><br>Current limit outwards | 20A for both current limit directions. (When the current outputs are at zero, it means that they are at maximum value 20A).<br>Be aware:<br>When the actuator comes with current cut-off limits that are factory pre-configured for certain values, the pre-configured values will be the new maximum level of current cut-off.<br>This means that if the current cut-off limits are pre-configured to 14A, it will not be possible to change the current limits through BusLink to go higher than 14A. | Recommended range: 4A to 20A<br><br>If the temperature drops below 0°C, all current limits will automatically increase to approximately 30A, indenpendent of the pre-configured value. | The actuator's unloaded current consumption is very close to 4A, and if the current cut-off is customised below 4A there is a risk that the actuator will not start.<br>The inwards and outwards current limits can be configured separately and do not have to have the same value. |
| Max. speed inwards/ outwards | 100% equal to full performance | Lowest recommended speed at full load: 60%<br>It is possible to reduce the speed below 60%, but this is dependable on load, power supply and the environment. | The speed is based on a PWM principle, meaning that 100% equals the voltage output of the power supply in use, and not the actual speed. |
| Virtual endstop inwards<br><br>Virtual endstop outwards | 0mm for both virtual enstop directions.<br>(When the virtual endstops are at zero, it means that they are not in use). | It is only possible to run the actuator with one virtual endstop, either inwards or outwards.<br>Scaling of feedback when choosing analogue feedback.<br>All Absolute feedback levels must follow the chosen virtual end-stop, if any are set.<br>When virtual end-stop is chosen through the bus link, the actuator will need initialisation and feedback will be adjusted accordingly to the virtual end-stop. | The virtual endstop positions are based on hall sensor technology, meaning that the positioning needs to be initialised from time to time. One of the physical endstops must be available for initialisation. |

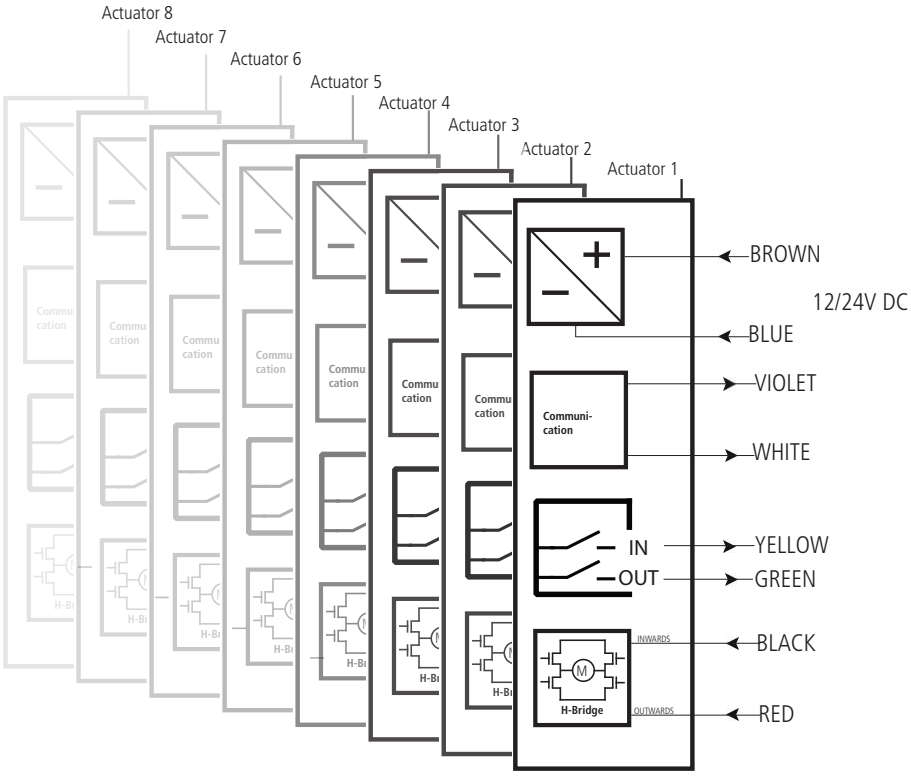
## Actuator configurations available for IC Basic, IC Advanced and Parallel

| | **Pre-configured** | **Customised range (Not IC Basic)** | **Description** |
|---|---|---|---|
| Soft stop inwards | 0.3 sec. for both soft stop directions. | 0.3 sec. to 30 sec.<br>0 sec. can be chosen for hard stop. | It is not possible to configure values between 0.01 sec. to 0.29 sec. This is due to the back-EMF from the motor (increasing the voltage).<br>Be aware that the soft stop value equals the deacceleration time after stop command. |
| Soft stop outwards | | | |
| Soft start inwards | 0.3 sec. for both soft start directions. | 0 sec. to 30 sec. | Be aware that the soft start value equals the acceleration time after start command.<br>To avoid stress on the actuator, it is not recommended to use 0 sec. for soft start, due to higher inrush current. |
| Soft start outwards | | | |

## Actuator with Parallel

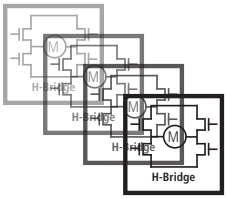
## Connection diagram:

Fig. 15 : 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 18).

## 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.<br>The version with "IC option" cannot be operated with PWM (power supply).<br>See connection diagram, fig. 15, page 49 |  |
| Brown | 12-24VDC + (VCC)<br>Connect Brown to positive<br>12V ± 20%<br>24V ± 10%<br>12V, current limit 30A<br>24V, current limit 20A | Note: Do not change the power supply polarity on the brown and blue wires!<br>The parallel actuators can run on one OR separate power supplies<br>Power supply GND (-) is electrically connected to the housing<br>Current limit levels can be adjusted through BusLink (only one actuator at a time for parallel)<br>If the temperature drops below 0°C, all current limits will automatically increase to 30A |
| Blue | 12-24VDC - (GND)<br>Connect Blue to negative<br>12V ± 20%<br>24V ± 10%<br>12V, current limit 30A<br>24V, current limit 20A | |
| Red | Extends the actuator | On/off voltages:<br>> 67% of $V_{IN}$ = ON<br>< 33% of $V_{IN}$ = OFF<br>Input current: 10mA<br>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 | |

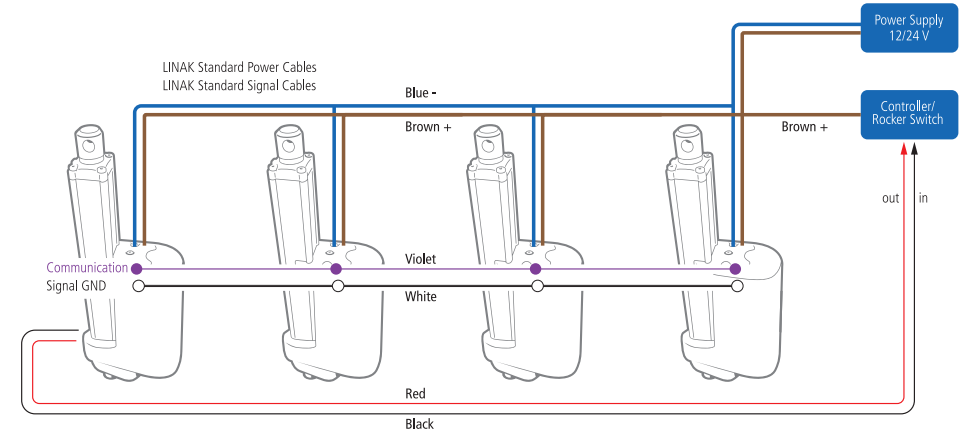
## Actuator with Parallel I/O specifications:

| Input/Output | Specification | Comments |
|---|---|---|
| Green | Endstop signal out | Output voltage min. $V_{IN}$ - 2V<br>Source current max. 100mA<br><br>Endstop signals are NOT potential free. Endstop signals can be configured with BusLink software according to any position needed |
| Yellow | Endstop signal in | |
| Violet | Parallel communication:<br>Violet cords must be connected together | Standby power consumption:<br>12V, 60mA<br>24V, 45mA<br><br>No feedback available during parallel drive |
| White | Signal GND:<br>White cords must be connected together | For correct wiring of power GND and Signal GND see page 45 |

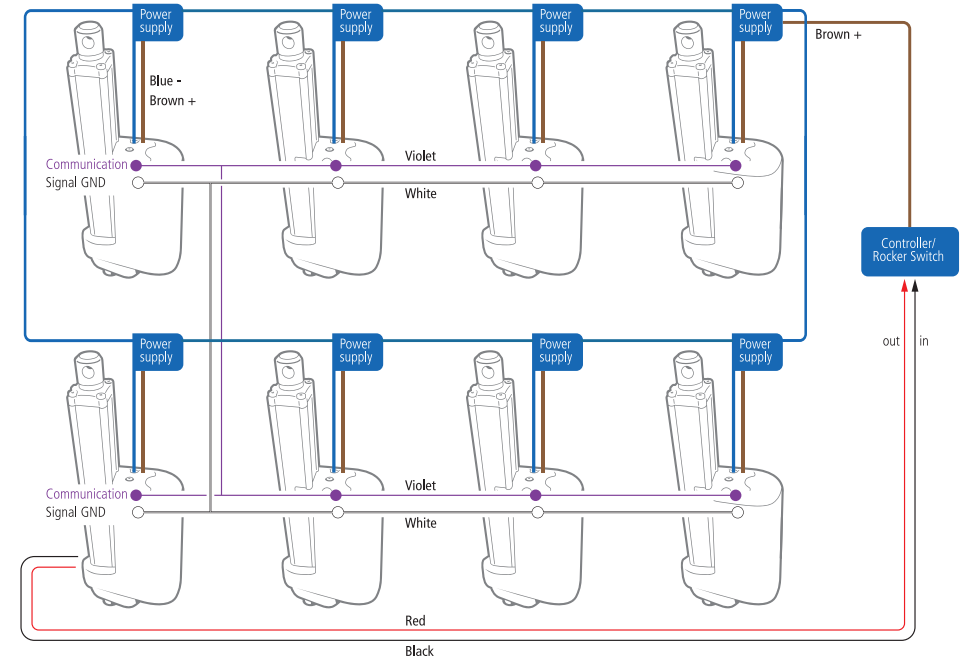
- Current cut-offs should not be used as stop function! This might damage the actuator. Current cut-offs should only be used in emergencies!
- Current cut-off limits are not proportional with the load curves of the actuator. This means that the current cut-offs cannot be used as load indicator.
- There are tolerances on the spindle, nut, gear wheels etc. and these tolerances will have an influence on the current consumption for the specific actuator.

## 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.

If separate power supplies are used, they must have the same potential, and the power supply GND (blue wires) must be connected together.

## BusLink software tool and the parallel system

The BusLink software tool is available for parallel and can be used for:
Configuration, Manual run and Diagnostics (service counter)

The BusLink software can be downloaded on: 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/corporate/pdf/ENGLISH/BROCHURE/TECHLINE_BusLink%20Quick%20Guide_Brochure_Eng.pdf

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

Item number for BusLink cable kit: 0367999 (adaptor + USB2Lin)

Only through the BusLink software tool is it possible to state if the system is Parallel or Non-critical Parallel. Via this tool it is also possible to reconfigure the whole system from one system to the other.

## The parallel system

- The system does not have to run on one main power supply only – it can be supplied by individual supplies corresponding to the number of actuators in the system. Please respect the actuator specifications regarding voltage level and current consumption!
- 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 an actuator drops off the line due to e.g. a damaged signal cable, the parallel system will stop immediately
- 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 or configured to a Non-critical Parallel system via the Buslink software tool

Only for Non-critical Parallel systems

- The Non-critical Parallel system offers auto-detection for every single power up if a new actuator is added to the line (system)

- To add or remove actuators from the system, the system needs to be shut down and powered up again. Please be aware, that after re-powering, the system will not detect if an actuator is missing!

- If adding a new actuator to the system, be aware that the actuator needs to have the same configuration (Non-critical Parallel) as the existing ones; this can be done via the Buslink software tool

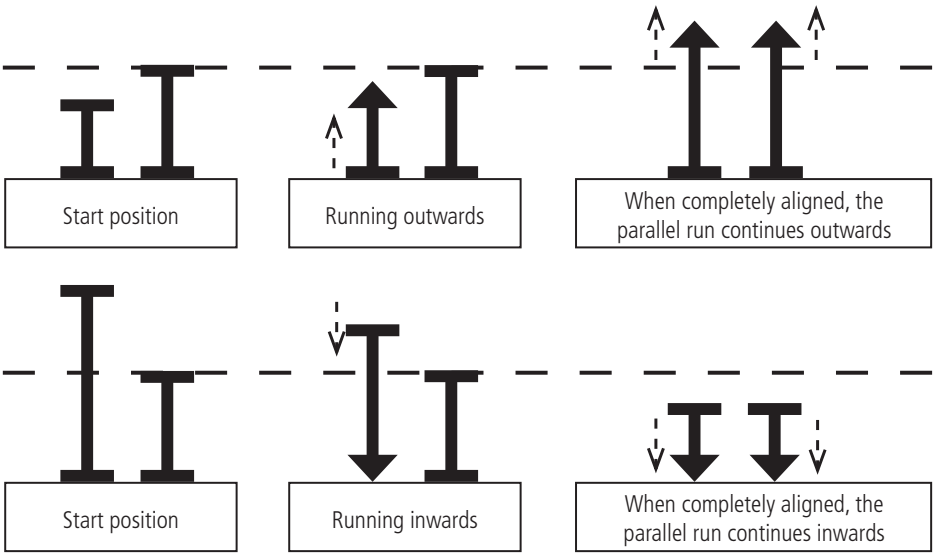
## System Monitoring for Parallel

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:



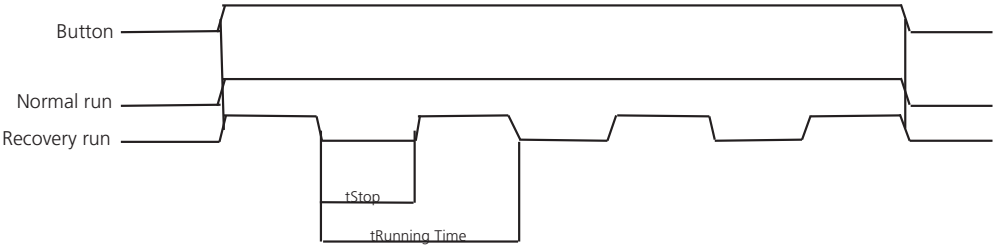
**Recovery mode:**

The purpose of recovery run mode is to have the ability to move the actuators at a reduced performance, even if one of the actuators in the system has lost its position (eg. due to failure with CRC, Hall or EOS). The movement in steps will indicate to the user that something is wrong.

Since the position is unknown to at least one actuator in the system, the parallel system wil move without synchronisation. This introduces the risk of unaligned movement if one of the actuators is physically unable to move.

Recovery run mode will not engage if a wrong number of actuators is connected in the system.

If recovery run mode is engaged, it will cause a movement as shown below:




**Recovery run mode:**

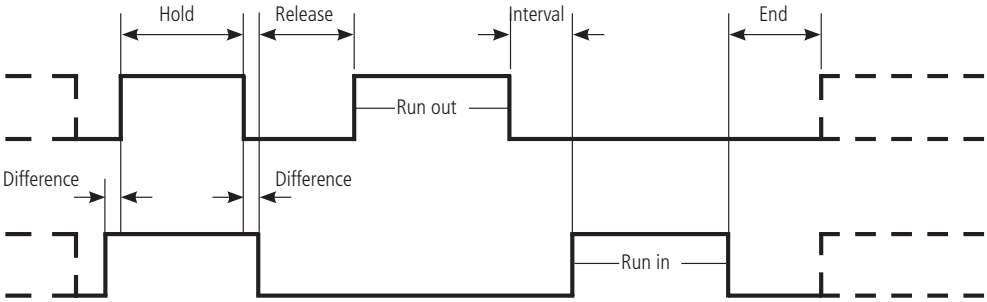
| | |
|---|---|
| tStop | 2000ms |
| tRunning Time | 4000ms |

## 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:<br>To extend the actuator: Connect only the Red wire(s) to the power supply<br>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 | - | - |

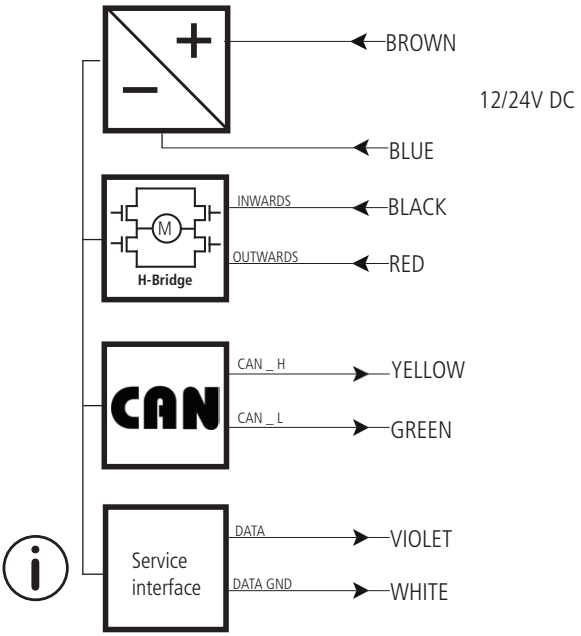



Instead of manually disconnecting all signal cables from the actuators, you can integrate a switch or relay to easily turn off the signal on the violet wires.

## Actuator with CAN bus

## Connection diagram:

Fig. 16 : 36xxxxxCDxxxxxx




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

CAN bus actuators are produced and delivered in the inner endstop position.

**The BusLink software tool (v.2.0 or later versions) is available for CAN bus and can be used for:** Diagnostics, manual run and configuration.
BusLink LIN is only intended for service interface.

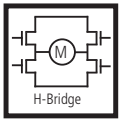
Download BusLink software here: **http://www.linak.com/techline/?id3=2363**

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!

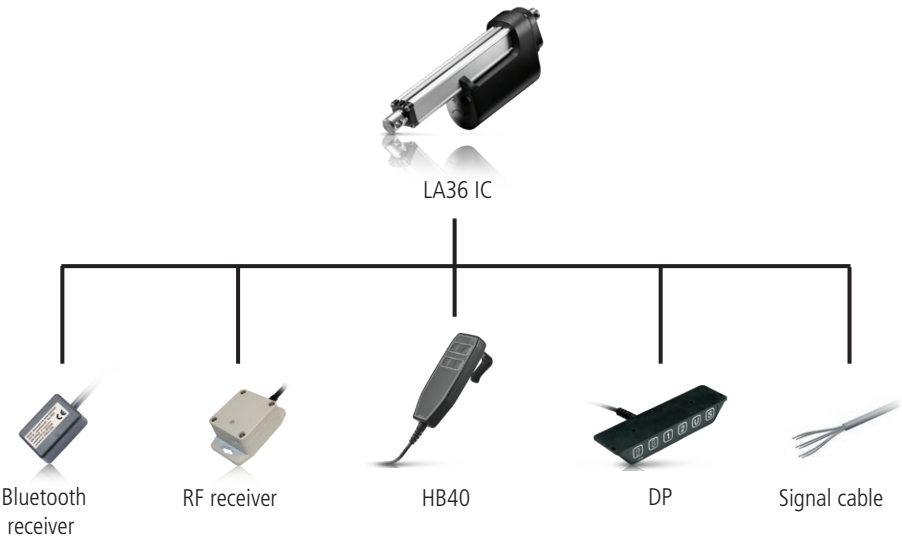
Item number for BusLink cable kit: 0367997 (adaptor + USB2Lin)

## Actuator with CAN bus
## I/O specifications:

| Input/Output | Specification | Comments |
|---|---|---|
| Description | Compatible with the SAE J1939 standard. Uses CAN messages to command movement, setting parameters and to deliver feedback from the actuator.<br>See the LINAK CAN bus user manual.<br>Actuator identification is provided, using standard J1939 address claim or fixed addresses.<br>See connection diagram, fig. 16, page 57 |  |
| Brown | 12-24VDC + (VCC)<br>Connect Brown to positive<br>12V ± 20%<br>24V ± 10%<br>12V, current limit 30A<br>24V, current limit 20A | Note: Do not swap the power supply polarity on the brown and blue wires!<br>Power supply GND (-) is electrically connected to the housing<br>Current limit levels can be adjusted through BusLink<br>If the temperature drops below 0°C, all current limits will automatically increase to 30A |
| Blue | 12-24VDC - (GND)<br>Connect Blue to negative | |
| Red | Extends the actuator | On/off voltages:<br>> 67% of $V_{IN}$ = ON<br>< 33% of $V_{IN}$ = OFF |
| Black | Retracts the actuator | |
| Green | CAN_L | LA36 with CAN bus does not contain the 120Ω terminal resistor. The physical layer is in accordance with J1939-15. *<br>Speed: Autobaud up to 500 kbps (Prototypes: 250 kbps)<br>Max bus length: 40 meters<br>Max stub length: 3 meters<br>Max node count: 10 (can be extended to 30 under certain circumstances)<br>Wiring: Unshielded twisted pair<br>Cable impedance: 120 Ω (±10%) |
| Yellow | CAN_H | |
| Violet | Service interface | Only BusLink can be used as service interface. Use green adapter cable |
| White | Service interface GND | |

* J1939-15 refers to Twisted Pair and Shielded cables. The standard/default cables delivered with LA36 CAN do not comply with this.

## System combination possibilities for LA36 IC Advanced




| Type: | Article No. | |
|---|---|---|
| Bluetooth receiver<br>Compatible with iPhone 4S and up or Android | TR-LMC2015* | |
| | **EU Market (868.3MHz)** | **US market (916 MHz)** |
| RF receiver | TR-TVPLRX868A02* | TR-TVPLRX916A02* |
| TXP transmitter | TR-TVTXP868A02* | TR-TVTXP916A02* |
| EVO transmitter | TR-TVEVO868N03* | TR-TVEVO916S03* |
| HB40 | HB4X051-01 | |
| DP | DP042-00 | |
| Standard TECHLINE signal cables | See the table below | |

*For more information, please go to www.linakthirdparty.com

## TECHLINE signal cables

| Plug types | Article No. | Material | # Wires | Size | Colour | Length (mm) | Cable type |
|---|---|---|---|---|---|---|---|
| Flying leads* | 0367049-1500 | PVC | 6 | 20AWG | Black | 1500 | Straight |
| Flying leads* | 0367049-5000 | PVC | 6 | 20AWG | Black | 5000 | Straight |

* The cable comes with an AMP connector that can be removed for flying leads

# Chapter 3

## Troubleshooting

| Symptom | Possible cause | Action |
|---|---|---|
| **Motor runs but spindle does not move** | Gearing system or spindle damaged | Please contact LINAK |
| **No motor sound or movement of piston rod** | The actuator is not properly connected to the power supply | Check the connection to the power supply or the external control unit (if any) |
| | Customer fuse burned | Check the fuse |
| | Cable damaged | Change the cable |
| | For IC Advanced only:<br>Wrongly connected | For IC Advanced only:<br>**Please make sure that the power supply polarity is properly connected, otherwise you might damage the actuator**<br>Check the wire connection on the internal control unit |
| **Excessive power consumption** | Misalignment or overload in the application | Align or reduce the load |
| | | Try to run the actuator without load |
| **Actuator cannot lift full load or motor runs too slowly** | Misalignment or overload in the application | Align or reduce the load |
| | | Try to run the actuator without load |
| | Insufficient power supply | Check the power supply |
| | For IC Advanced only:<br>Internal current limit reached<br>Actuator speed is too low | For IC Advanced only:<br>Connect the actuator to BusLink and check the existing parameters |

## Troubleshooting

| Symptom | Possible cause | Action |
|---|---|---|
| **No signal or incorrect feedback output** | Cable damaged | Change the cable |
| | Wrongly connected | Check the wiring |
| | Signal is constantly high/low | Run the actuator to fully extended and retracted positions |
| | Feedback output overloaded | Reduce the load according to your chosen feedback type |
| | For IC Advanced only:<br>Incorrect feedback output/level | For IC Advanced only:<br>Connect the actuator to BusLink and check for correct feedback option |
| **Actuator runs in smaller steps** | Insufficient power supply | Check the power supply |
| | Load is higher than specified | Reduce the load |
| | For IC Advanced only:<br>Internal safety procedure activated | For IC Advanced only:<br>Connect the actuator to BusLink and check the following:<br>- Reason for last stop (page 62)<br>- Current cut-off levels in both directions |
| **Actuator cannot hold the chosen load** | Load is higher than specified | Reduce the load |

For further assistance, please contact your local LINAK supplier.

## Troubleshooting for Parallel

| Symptom | Possible cause | Action |
|---|---|---|
| **Actuators do not move** | The actuators are not properly connected to the power supply | Check the connection to the power supply or the external control unit (if any)<br>**Please make sure that the power supply polarity is properly connected, otherwise you might damage the actuator**<br>⚠ Please see non-critical info below |
| | Wrong number of actuators in the system | Check if the number of actuators in the system match the number that was ordered |
| | Communication wires are not properly connected | Check the parallel communication wires for all actuators |
| | Signals run in/run out are not properly connected | Check the wire connection on the internal control unit |
| | Position lost | Disconnect all cables, connect the actuator(s) to BusLink one at a time and check the following:<br>- Reason for last stop (page 62) |
| | | After everything is connected, put power on all actuators at the same time. Then wait 10 seconds before the Run In/Run Out signals are activated |
| | | If this does not work, initiate the Parallel manual service mode (page 56) |
| **Actuators cannot lift full load** | Insufficient power supply | Check the power supply while the actuator is running |
| | Overload in application | Reduce the load |
| | | Connect actuator(s) to BusLink one at a time and check the following:<br>- Type of chosen Parallel system<br>- Reason for last stop (page 60)<br>- Current cut-off levels in both directions<br>⚠ Please see non-critical info below |
| | | After everything is connected, put power on all actuators at the same time. Then wait 10 seconds before the Run In/Run Out signals are activated |

⚠ Only for Non-critical Parallel:
Even if all actuators are not connected, the connected actuators will run after re-powering.
More information on page 54

## Troubleshooting for Parallel

| Symptom | Possible cause | Action |
|---|---|---|
| **Actuators run in smaller steps before stop** | Insufficient power supply | Check the power supply while the actuator is running |
| | | Connect the actuator(s) to BusLink one at a time and check the following:<br>- Reason for last stop (page 62)<br>- Current cut-off levels in both directions |
| | | After everything is connected, put power on all actuators at the same time. Then wait 10 seconds before the Run In/Run Out signals are activated |
| **Signal cable damaged or removed under operation** | All actuators stop at the same position | The signal and power cables MUST be re-connected to all actuators.<br>**Ensure that no actuator is missing in the system. Otherwise, the system will not work, not even after re-powering**<br>⚠ Please see non-critical info below |
| | | After everything is connected, put power on all actuators at the same time. Then wait 10 seconds before the Run In/Run Out signals are activated |

⚠ Only for Non-critical Parallel:
Even if all actuators are not connected, the connected actuators will run after re-powering.
More information on page 54

ⓘ For further assistance, please contact your local LINAK supplier

## BusLink service counter - Reason for last stop

| Possible cause | Action/Info |
|---|---|
| H-bridge error<br>Internal SMPS error | • Please contact your local LINAK supplier for further instructions |
| Overcurrent | • The actuator(s) cannot continue in the same direction<br>• Reactivation is needed in the opposite direction |
| EOS error | • Please contact your local LINAK supplier |
| Hall error | • The actuator(s) stop. When seeing hall error, the actuator goes into 'position lost', and the whole system will need initialisation<br>ⓘ Find more info on the initialisation procedure below |
| Out of range temperature for ambient location<br>Out of range temperature at FET location<br>The above can be due to high environment temperature or high duty cycle | • The error causes the actuator(s) to stop. After elimination of the error (cooling down) and reactivation of the movement, the actuator(s) will move normally<br>**• This may not be used for stopping the actuator(s)** |
| Overvoltage | • When detecting overvoltage, the actuator(s) stop. The actuator(s) remain stopped until the error condition is removed. To remove the error condition, the voltage level must be below 38V and the Run In/Run Out signals must be removed before the next movement |
| Undervoltage | • When detecting undervoltage, the actuator(s) stop. The actuator(s) remain stopped until the error condition is removed. To remove the error condition, the voltage level must be above 8V and the Run In/Run Out signals must be removed before the next movement |

**Initialisation procedure:**

To initialise the actuator(s), move each actuator into fully extended and fully retracted position. Either initialise the actuators one at a time through BusLink, or use the Parallel manual service mode (see page 56).

In case the initialisation does not solve the issue, please contact your local LINAK supplier

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**

# Chapter 4

## Specifications

| | |
|---|---|
| Motor: | Permanent magnet motor 12, 24, or 36V * |
| Cable: | Motor: 2 x 14 AWG PVC cable<br>Control: 6 x 20 AWG PVC cable ** |
| Gear ratio: | 6 different gear ratios available in steel<br>(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<br>Inner tube: Stainless steel AISI304/SS2333<br>Acme spindle: Trapezoidal spindle with high efficiency |
| Temperature range: | - 30° C to +65° C For IECEx/ATEX: - 25° C to +65° C<br>- 22° F to +149° F - 13° F to +149° F<br>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:**

- Duty cycle at 600mm stroke is max. 20% (4 min. drive and 16 min. rest)
  Duty cycle at 601-999mm stroke is max. 15% (3 min. drive and 17 min. rest)
  Duty cycle at 10,000 N is max. 5%
- Storage temperature: -55° C to +105° C
- Noise level: 73 dB (A) measuring method DS/EN ISO 3743-1 actuator not loaded

- **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

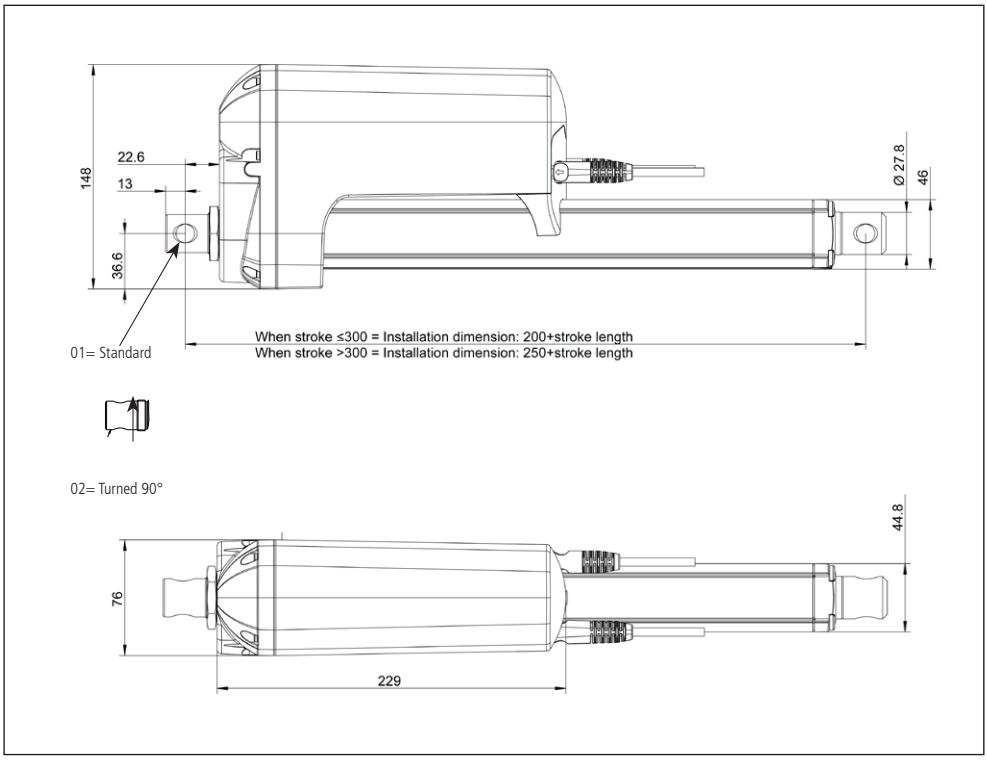
  Mechanical endstop
  LA36 is equipped with mechanical endstop

* 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**

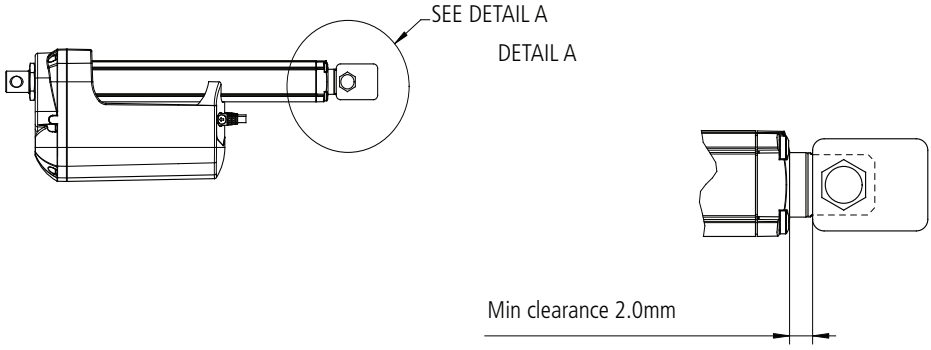
## Actuator dimensions

## TECHLINE® LA36:




### Keep a clearance when mounting a bracket

When mounting a custom bracket on the moving part of the actuator, please observe the minimum clearance between bracket and cylinder top, when fully retracted, to avoid jamming and destruction of actuator drive train.

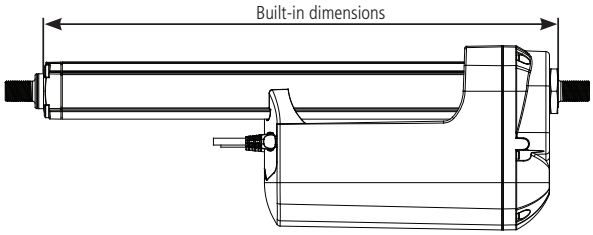


## Built-in dimensions

| 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" / to the centre of the hole | |
|---|---|---|---|---|---|---|---|---|
| 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

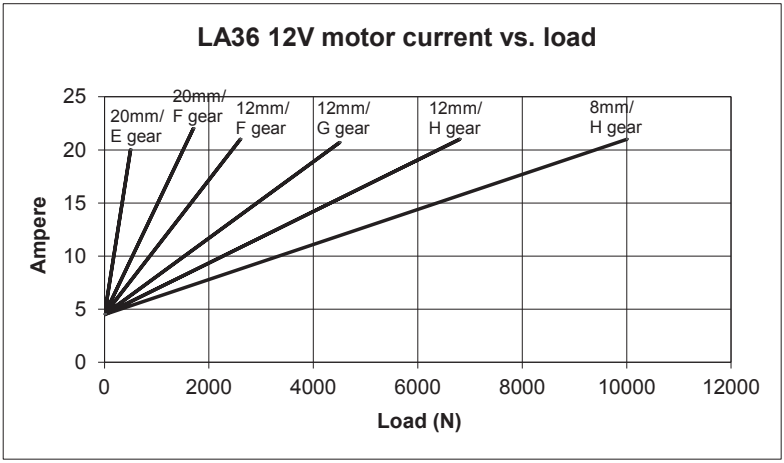
**Piston rod movement per turn, app.:**

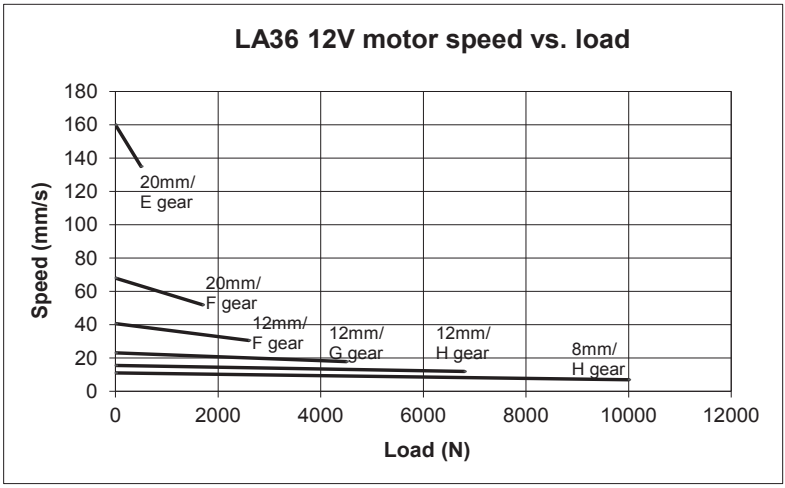
| | 8 mm | 12 mm | 20 mm |
|---|---|---|---|
| Gear A | - | 11 mm | 18 mm |
| Gear B | - | 6 mm | 10 mm |
| Gear C | 3 mm | 4 mm | 7 mm |
| Gear F | - | - | 27 mm |

- 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.




When ordering LA36F

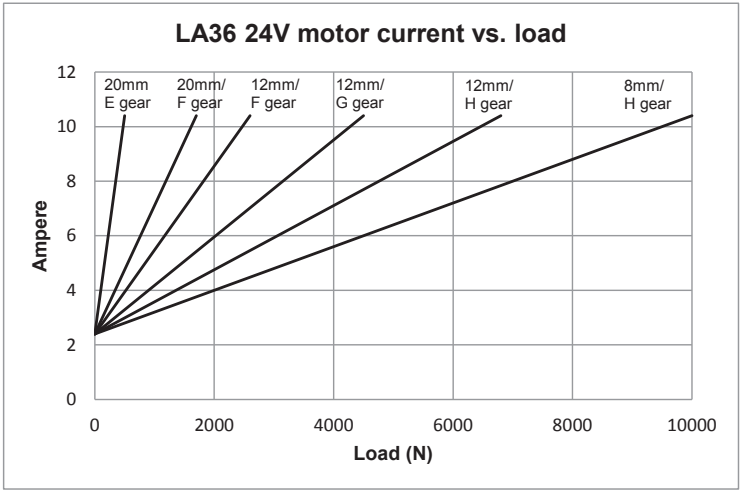
When purchasing the LA36 actuator with fast gear and slide for the end-stop function, the customer has been informed that there is an increased risk that the activation arm for end-stop can be damaged during use, especially if the actuator runs to limit switch without load, both in the inner or outer position. A defective activation arm will inevitably lead to an inoperative end-stop function.

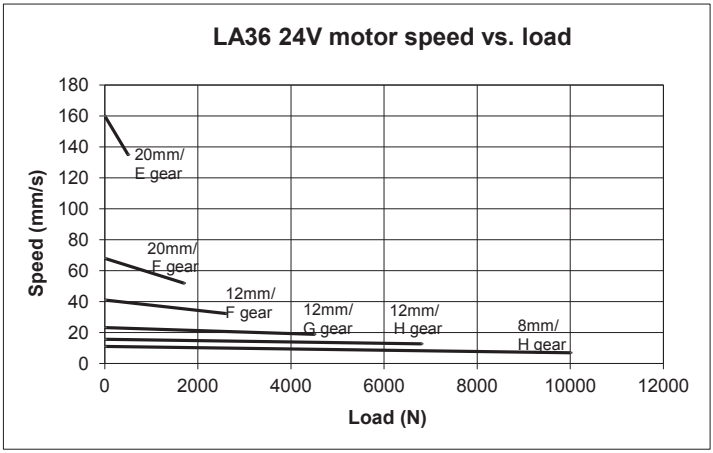
All measurements above describe the spindle pitch (e.g. 20mm) and the gear type (e.g. E gear) of the actuator.

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.




When ordering LA36F

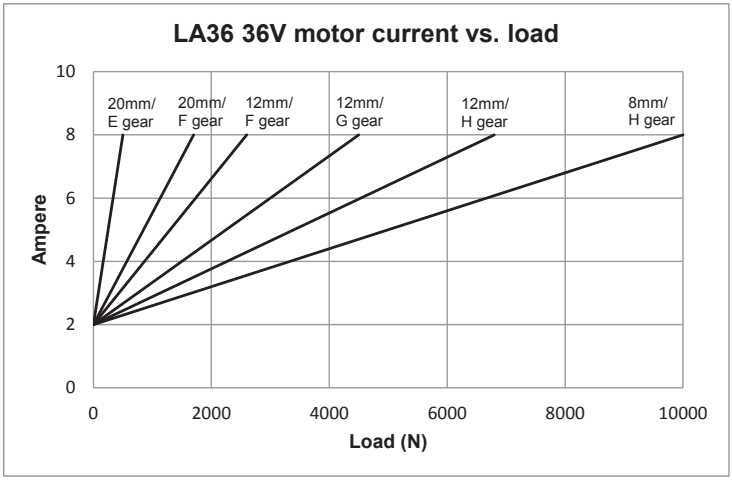
When purchasing the LA36 actuator with fast gear and slide for the end-stop function, the customer has been informed that there is an increased risk that the activation arm for end-stop can be damaged during use, especially if the actuator runs to limit switch without load, both in the inner or outer position. A defective activation arm will inevitably lead to an inoperative end-stop function.

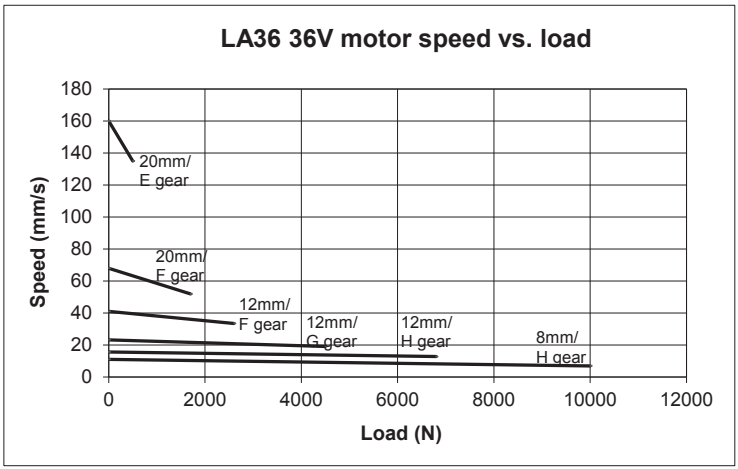
All measurements above describe the spindle pitch (e.g. 20mm) and the gear type (e.g. E gear) of the actuator.

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.




When ordering LA36F

When purchasing the LA36 actuator with fast gear and slide for the end-stop function, the customer has been informed that there is an increased risk that the activation arm for end-stop can be damaged during use, especially if the actuator runs to limit switch without load, both in the inner or outer position. A defective activation arm will inevitably lead to an inoperative end-stop function.

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

## Label for LA36 IECEx/ATEX


1. **Type.: 36xxxx+xxxxxx8x**
   Describes the basic functionality of the product.
2. **Item no.: 36xxxx-xx**
   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 xxxx N / Pull xxxxN 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.: XX V / Max. xx Amp**
   Input voltage for the product and maximum current consumption
6. **Duty Cycle.:**
   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 #xxxxxxx**
   The LINAK work order followed by a unique sequential identification number

**CE 0402 Ex II 2D Ex tb IIIC T135°C Db**

- CE 0402 — Quality assurance notification body
- Ex — Equipment for hazardous areas
- II — Non mining
- 2D — Category 2 equipment for dust
- Ex — Explosion protection
- tb — Protection by Enclosure
- IIIC — Combustible dust - conductive *
- T135°C — Temperature class
- Db — Enclosure Zone 21

**Tamb -25°C to +65°C**

- Tamb — Ambient temperature of operation

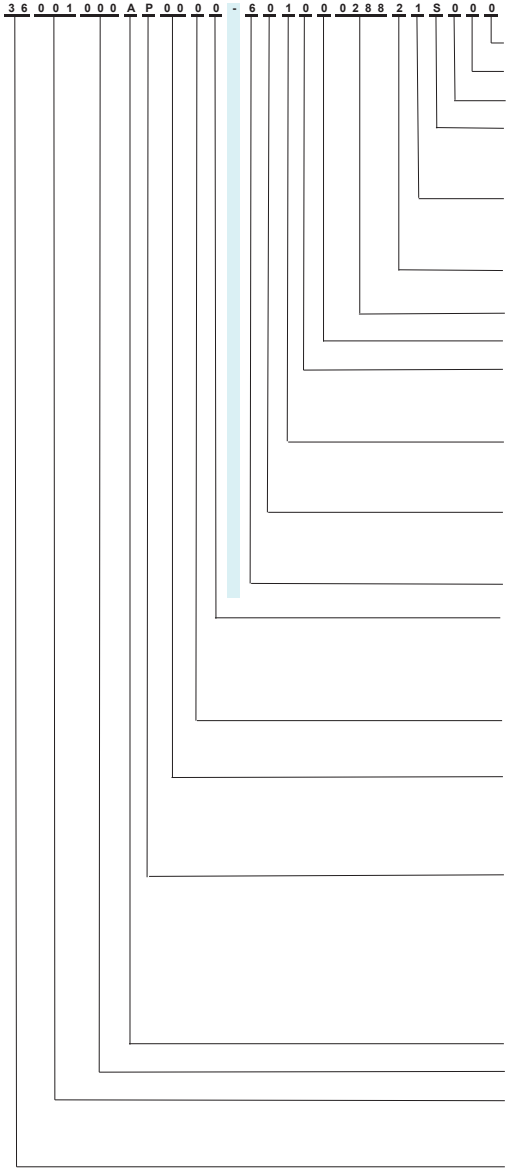
* Not a source of ignition in normal operation or when subjected to faults that may be expected, though not on a regular basis.

## Key to symbols

The following symbols are used on the LA36 labels:

| Symbol | Norms | Approvals |
|---|---|---|
|  | WEEE Directive 2002/96/EC | Wheelie bin |
|  | Compliance to all relevant EC directives | CE |
|  | Regulatory Compliance Mark:<br>The Australian safety/EMC regulations | RCM |
|  | 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

**TYPE**

**36** = LA36

**SPINDLE TYPE**

**2** = 8mm
**3** = 12mm
**5** = 20mm
**A** = 8mm + magnet for adjustable reed switch
**C** = 12mm + magnet for adjustable reedswitch
**E** = 20mm + magnet for adjustable reed switch

**GEAR BOX**

| | | 2.5 mm pitch | 8 mm pitch | 12 mm pitch | 16 mm pitch | 20 mm pitch |
|---|---|---|---|---|---|---|
| **A** = | Gear ratio 1:18 / 2600N or 1700N | N.A. | N.A. | 2.600 N | 1950 N | 1.700 N |
| **B** = | Gear ratio 1:31 / 4500N | N.A. | N.A. | 4.500 N | 3375 N | N.A. |
| **C** = | Gear ratio 1:46 / 6800N or 10000N | 10.000 N | 10.000 N | 6.800 N | 5100 N | N.A. |
| **F** = | Gear ratio 1:7 / 500N | N.A. | N.A. | N.A. | N.A. | 500 N |

**BACK FIXTURE**

**0** = M20 x 1 female adapter
**1** = 12,9 mm hole (for 1/2" pin)
**2** = 12,9 mm hole turned 90° (for 1/2" pin)
**3** = 12,2 mm hole (for 12mm pin)
**4** = 12,2 mm hole turned 90° (for 12mm pin)
**5** = M12 x 1,75 male adapter
**6** = M16 x 1,5 male adapter
**7** = 12,2 mm hole with slot (like LA34)
**8** = 12,2 mm hole with slot (like LA34) - turned 90°

**A** = 12,2 mm hole with slot - AISI 304
**B** = 12,2 mm hole with slot turned 90° in AISI 304
**C** = 12,9 mm hole with slot - AISI 304
**D** = 12,9 mm hole with slot turned 90° - AISI 304

**PISTON ROD EYE**

**0** = M20 x 1 female adapter
**1** = 12,9 mm hole (for 1/2" pin)
**2** = 12,2 mm hole (for 12mm pin)
**3** = M12 x 1,75 male adapter
**4** = M16x1,5 male adapter
**5** = 12,2 mm hole with slot (like LA34)
**A** = 12,2 mm hole with slot - AISI 304
**B** = 12,9 mm hole with slot - AISI 304
**C** = Ball eye Ø12,2
**D** = Ball eye Ø16

**SAFETY NUT**

**+** = Standard
**S** = With safety nut

**END STOP**

**0** = No limit switch
**1** = Limit switch
**2** = Limit switch and EOS

**IC**

**7** = IC Basic
**8** = IC Advanced
**9** = IC Parallel
**A** = MODBUS
**B** = LINBUS
**C** = CAN bus (J1939)

**FEEDBACK**

**0** = Standard (No feedback)
**B** = Analogue feedback 0-10V
**C** = Analogue feedback 0.5-4.5V
**H** = Dual Hall
**K** = Single Hall
**P** = Potentiometer
**5** = PWM 10-90%
**6** = PWM 20-80%

**IC Feedback**

**D** = Bus (LINbus: CAN bus or Modbus)
**1** = Single Hall
**2** = Analogue feedback 0-10V
**3** = Analogue feedback 0.5-4.5V
**4** = Analogue 4-20mA
**5** = PWM 10-90%
**6** = PWM 20-80%

**STROKE LENGTH**

**100** = 100mm
**150** = 150mm
**200** = 200mm
**250** = 250mm
**300** = 300mm
**350** = 350mm
**400** = 400mm
**450** = 450mm
**500** = 500mm
**550** = 550mm
**600** = 600mm
**650** = 650mm
**700** = 700mm
**750** = 750mm
**800** = 800mm
**850** = 850mm
**900** = 900mm
**950** = 950mm
**999** = 999mm

**MOTOR TYPE**

**A** = 12 VDC
**B** = 24 VDC
**C** = 36 VDC
**1** = 12 VDC without clutch
**2** = 24 VDC without clutch
**3** = 36 VDC without clutch

**IP DEGREE**

**2** = IP66 Dynamic / IP69k Static
**8** = IECEx / ATEX certified
**9** = Harsh environment housing (IP66/IP69k)

**CABLES**

**0** = No cable
**1** = 1,5m cable (0367046-1500)
**2** = 5 m cable (0367046-5000)
**3** = 0,2 m power cable with AMP connector (0367006)
**4** = 1,5 m power cable +1,5m signal cable
**5** = 5 m power cable + 5 m signal cable
**6** = Y-cable power and signal cable in one (0367020)
**7** = 5 m powercable & datacable M12x1 (Bus)

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 Actuators:
36xxxxx0xxxxxx, 36xxxxx1xxxxxx, 36xxxxx2xxxxxx, 36xxxxx5xxxxxx
(The 'X' s in the product description can either be a character or a number, thereby defining the variation of the product)

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 the ATEX Directive 2014/34/EU according to following standards:
EN 60079-0:2012, EN 60079-31:2014

complies with the 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, 2016-05-11

**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)<br>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

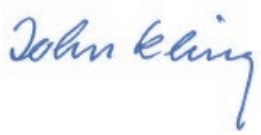
complies with RoHS2 Directive 2011/65/EU according to the standard:
EN 50581:2012

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 CONFORMITY

LINAK A/S

Smedevænget 8

DK - 6430 Nordborg

Hereby declares that

Actuator LA36CAN series
36xxxxxCDxxx1xx, 36xxxxxCDxxx2xx, 36xxxxxCDxxxAxx, 36xxxxxCDxxxBxx
(The 'X' s in the product description can either be a character or a number, thereby defining the variation of the product)

complies with the EMC Directive 2014/30/EU according to following 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 harmonized 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, 2016-09-08

**LINAK A/S**
John Kling, B.Sc.E.E.
Regulatory Affairs Manager
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

# IECEx Certificate of Conformity

## INTERNATIONAL ELECTROTECHNICAL COMMISSION
## IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

| | | |
|---|---|---|
| Certificate No.: | IECEx TUN 14.0021X issue No.:0 | Certificate history: |
| Status: | **Current** | |
| Date of Issue: | **2015-10-13** | Page 1 of 4 |
| Applicant: | **Linak A/S**<br>Smedevænget 8, Guderup<br>6430 Nordborg<br>**Denmark** | |
| Electrical Apparatus:<br>*Optional accessory:* | **Actuator type LA 36** | |
| Type of Protection: | **Protection by enclosure "tb"** | |
| Marking: | EX tb IIIC T135 °C Db | |
| *Approved for issue on behalf of the IECEx Certification Body:* | Andreas Meyer | |
| *Position:* | Head of the Certification Body | |
| *Signature:*<br>*(for printed version)* | | |
| *Date:* | 2015-10-13 | |

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

**TÜV NORD CERT GmbH**
**Hanover Office**
**Am TÜV 1**
**30519 Hannover**
**Germany**

TÜV NORD

# IECEx Certificate of Conformity

Certificate No.: IECEx TUN 14.0021X

Date of Issue: **2015-10-13** Issue No.: **0**



Manufacturer: **Linak A/S**
Smedevænget 8, Guderup
DK-6430 Nordborg
**Denmark**

Additional Manufacturing location (s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

**STANDARDS:**
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

| | |
|---|---|
| **IEC 60079-0 : 2011** Edition: 6.0 | Explosive atmospheres - Part 0: General requirements |
| **IEC 60079-31 : 2013** Edition: 2 | Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t" |

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

**TEST & ASSESSMENT REPORTS:**
*A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in*

Test Report:
DE/TUN/ExTR14.0044/00

Quality Assessment Report:

SE/SP/QAR14.0001/00

# IECEx Certificate of Conformity

Certificate No.: IECEx TUN 14.0021X

Date of Issue: **2015-10-13** Issue No.: **0**



**Schedule**

**EQUIPMENT:**

*Equipment and systems covered by this certificate are as follows:*

The LA36 series of linear actuators creates motion in a straight line, as contrasted with circular motion of a conventional electric motor. The actuator consists of a motor, a gearbox and a spindle that causes the actuator to either extend or retract. The motor housing consists of a two part aluminium assembly with a cork gasket and an aluminium outer tube. The equipment is earthed externally through actuators fixation points: the piston rod eye and the back fixture. The actuators are rated for 12V, 24V or 36V DC with push / pull specifications in the range 500 N to 10.000 N.
Model LA36 can furthermore be delivered with an accessory, called "Rodent protection". This variant is mounted with an external cable gland for mechanical fixing of a cable conduit, to make the power and signal cable rodent protected. This external cable gland has no influence on the Ex-protection principle and the ingress protection is still kept IP6x.

**CONDITIONS OF CERTIFICATION: YES as shown below:**

1. The max. duty cycle is specified as follows at an ambient temperature of +25 °C:

| **LOAD 0-6800 [N]** | |
|---|---|
| STROKE | **DUTY CYCLE** |
| 0-600 [mm] | 20% int. - Max. 2 [min.] continuous drive followed by 8 [min.] rest. |
| 600-1000 [mm] | 15% int. - Max. 3 [min.] continuous drive followed by 17 [min.] rest. |

| **LOAD 10000 [N]** | |
|---|---|
| STROKE | **DUTY CYCLE** |
| 0-1000 [mm] | 5% int. - Max. 1 [min.] continuous drive followed by 19 [min.] rest. |

2. Ambient temperature area are specified to -25 °C to + 65 °C
3. The power supply cable is of special design fulfilling IP 6X ingress protection. The cable can be delivered in different lengths. Only cables delivered by Linak must be mounted.
4. The connection between the actuator and the fixing points must be conductive and furthermore the application must be grounded in order to remove any electrostatic charge. This relates to both the fixing point on the motor housing and the point on the piston rod.
5. The supply cable is not UV-resistant and must be protected from direct sunlight.

# IECEx Certificate of Conformity

Certificate No.: IECEx TUN 14.0021X

Date of Issue: **2015-10-13** Issue No.: **0**



**Additional information:**

The electrical data are as follows:

Supply (brown and blue)

Type 1 $U_n$ = 12 VDC ± 20%
$I_{max}$ = 26 A

Type 2 $U_n$ = 24 VDC ± 10%
$I_{max}$ = 13

Type 3 $U_n$ = 36 VDC ± 10%
$I_{max}$ = 10 A

Signal Power suppy (red and black)
$U_n$ = 12 - 24 VDC
$I_n$ = 40 mA

The ambient temperature range is:
-25°C up to 65°C

(1) **EC-Type-Examination Certificate**

(2) Equipment and protective systems intended for use in potentially explosive atmospheres, **Directive 94/9/EC**

| | | |
|---|---|---|
| (3) | **Certificate Number** | **TÜV 15 ATEX 143747 X** |
| (4) | for the equipment: | Linear Actuator<br>Model: LA36 series |
| (5) | of the manufacturer: | **LINAK A/S** |
| (6) | Address: | Smedevænget 8, Guderup<br>6430 Nordborg |
| | Order number: | 8000 436006 |
| | Date of issue: | 2015-10-13 |

(7) The design of this equipment or protective system and any acceptable variation thereto are specified in the schedule to this EC-Type-Examination Certificate and the documents therein referred to.

(8) The TÜV NORD CERT GmbH, notified body No. 0044 in accordance with Article 9 of the Council Directive of the EC of March 23, 1994 (94/9/EC), certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive. The examination and test results are recorded in the confidential report No. 15 203 143747.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
**EN 60079-0:2012** **EN 60079-31:2014**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment or protective system must include the following:

**II 2D Ex tb IIIC T135°C Db**

TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 Essen, notified by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The head of the notified body

Meyer

Hanover office, Am TÜV 1, 30519 Hannover, Fon +49 (0)511 986 1455, Fax +49 (0)511 986 1590

(13) **SCHEDULE**

(14) **EC-Type-Examination Certificate No. TÜV 15 ATEX 143747 X**

(15) Description of equipment

The LA36 series of linear actuators creates motion in a straight line, as contrasted with circular motion of a conventional electric motor. The actuator consists of a motor, a gearbox and a spindle that causes the actuator to either extend or retract. The motor housing consists of a two part aluminium assembly with a cork gasket and an aluminium outer tube. The equipment is earthed externally through actuators fixation points: the piston rod eye and the back fixture. The actuators are rated for 12V, 24V or 36V DC with push / pull specifications in the range 500 N to 10000 N.

Type variants:
The LA36 series of linear actuators can be delivered in different type variants in accordance with the manufacturers ordering nomenclature (below). The different type variants, which does not involve the design of the motor housing itself, has no influence on the Ex-protection principle Ex tb IIIC T135°C Db as long as the supplied power cable are delivered by the manufacturer.

Model LA36 can furthermore be delivered with an accessory, called "Rodent protection". This variant is mounted with an external cable gland for mechanical fixing of a cable conduit, to make the power and signal cable rodent protected. This external cable gland has no influence on the Ex-protection principle and the ingress protection is still kept IP6x.

| Actuator type | Spindle Pitch | Stroke length | Safety | Feedback | Platform | Motortype | IP degree | | Colour | Back fixture | Piston rod eye orientation | Gear | Brake | BID | Fire category | Plug type | Cable | Safety factor | Not specified | Not used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36 | *** | *** | * | * | ** | * | * | - | * | * | * | * | * | **** | * | * | * | * | * | |

The actuator are certified under the type LA36 including various type variants which has no influence on the ingress protection / Ex-protection principle. The manufacturers "Scheduled Drawings" specify the fixed part of the construction.

Supply (brown and blue)

| | | | | | |
|---|---|---|---|---|---|
| Type 1 | $U_n$ | = | 12 | VDC | + 20% |
| | $I_{max}$ | = | 26 | A | |
| Type 2 | $U_n$ | = | 24 | VDC | + 10% |
| | $I_{max}$ | = | 13 | A | |
| Type 2 | $U_n$ | = | 36 | VDC | + 10% |
| | $I_{max}$ | = | 10 | A | |

Signal Power suppy (red and black)

| | | | |
|---|---|---|---|
| $U_n$ | = | 12 - 24 | VDC |
| $I_n$ | = | 40 | mA |

(16) Test documents are listed in the test report No. 15 203 143747

(17) Special conditions for safe use

1. The max duty cycle specified at an ambient of +25 °C.

| LOAD 0-6800 [N] | |
|---|---|
| STROKE | DUTY CYCLE |
| 0-600 [mm] | 20% int. - Max. 2 [min.] continuous drive followed by 8 [min.] rest. |
| 600-1000 [mm] | 15% int. - Max. 3 [min.] continuous drive followed by 17 [min.] rest. |

| LOAD 10000 [N] | |
|---|---|
| STROKE | DUTY CYCLE |
| 0-1000 [mm] | 5% int. - Max. 1 [min.] continuous drive followed by 19 [min.] rest. |

2. Ambient temperature area are specified to -25 °C to + 65 °C
3. The power supply cable is of special design fulfilling IP 6X ingress protection. The cable can be delivered in different lengths. Only cables delivered by Linak must be mounted.
4. The connection between the actuator and the fixing points must be conductive and furthermore the application must be grounded in order to remove any electrostatic charge. This relates to both the fixing point on the motor housing and the point on the piston rod.

(18) Essential Health and Safety Requirements

no additional ones

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## 10 APPENDIX 4 – SPECIFICATION TR-EM-208-T-230

# TR-EM-208 STARTER AND CURRENT LIMIT FOR DC-MOTORS 12-35V 1-20A

## FEATURES

- **soft start**
- **soft stop**
- **limit switch input (stop)**
- **brake**
- **adjustable current limit**
- **impulse / continuous**
- **pos. / gnd control logic**
- **cmos / TTL / switch**
- **thermal protection**

TR-EM-208 is designed specially for spindle motor use. Adjustable soft start, soft stop and current limit are main features of the card. Additionally impulse or continuous type control can be selected as the control mode. Control input can be set to positive or negative (gnd) logic. Card has control inputs for forward, reverse and stop commands.
Stop has the highest priority and will be executed even if forward or reverse command is on. After stop, restarting can be done in both directions or only in reverse direction, according to condition setting.
During acceleration ramp and settling time the motor current is limited to 150% of the adjusted current limit value. After this start period, exceeding current limit will stop motor immediately. Current limit activation will always be indicated with error output and error led.
In overheat situation the thermal protection will be activated and it will switch off the control. This will be indicated with error output and with led blinking.

TECHNICAL DATA

| | |
|---|---|
| supply | 12-35Vdc (ripple max. 30%) |
| max. current | 12A cont. |
| | 20A 30% on / 70% off |
| idle current | 10mA typically |
| current limit | range1 1-5A (start 1.5x) |
| | range2 5-10A (start 1.5x) |
| | range3 10-20A (start 1.5x) |
| therm. protection | 120°C |
| start ramp | 0-3s adjustable |
| free deceleration | 0-3s adjustable |
| operating freq. | 2kHz |
| voltage loss | 0.6V ( Im 12A ) |
| control inputs | "1" = 4-30Vdc , "0" = 0-1V |
| error output | NPN open-coll. 30V 50mA |
| oper. temp. | -10...60°C |
| weight | 105g |

# TR-EM-208 SETTINGS AND CONNECTIONS

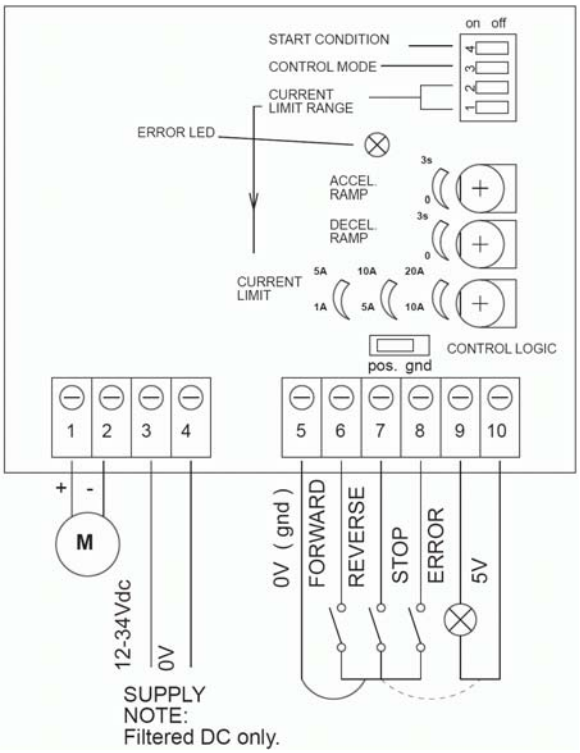


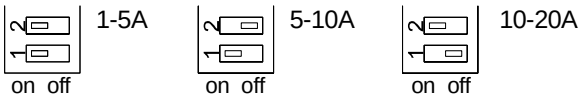

**Fig 1**

START CONDITION switch 4

"ON" = after STOP command or exceeding the current limit activation start only in reverse direction
"OFF" = after STOP command or exceeding the current limit activation start in either direction

CONTROL MODE switch 3
"ON" = impulse control, start with FORWARD or REVERSE control, stop with STOP or FORWARD or REVERSE
"OFF" = continuous drive, motor will only run as long as there is active FORWARD or REVERSE command

CURRENT LIMIT RANGE switches 1 & 2
First choose coarse current range (on+on = off+off)




ACCELERATION RAMP
set acceleration time 0-3s.

DECELERATION RAMP
Set the free deceleration time before braking, 0-3s.
NOTE: If D-ramp is set to 0s, the control commands will be executed immediately regardless of the previous command or the command under execution at the time.

CURRENT LIMIT
current limit fine adjustment.

CONTROL LOGIC switch, gnd- / pos-logic
Select control as gnd(NPN) or positive (PNP) control.
If positive control is used, 5V reference output or external 4-30Vdc can be used.

New settings will be loaded when card status is stop.

All control commands in Fig. 2 operate with so called positive logic (PNP-control, positive voltage commands). It is also possible to use GND controlling, in which all commands operate activate with zero voltage (NPN-control, inversely to positive control).

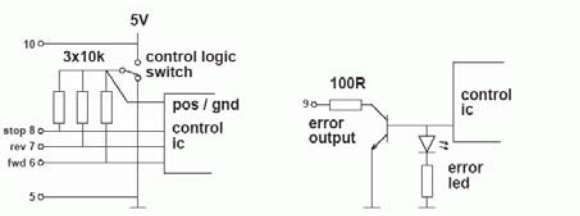



Fig 2 - forward, reverse and stop input




Fig 3 - error output and led

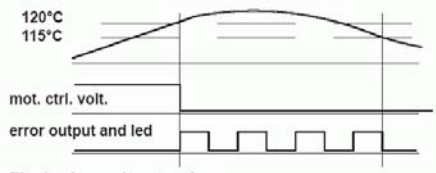


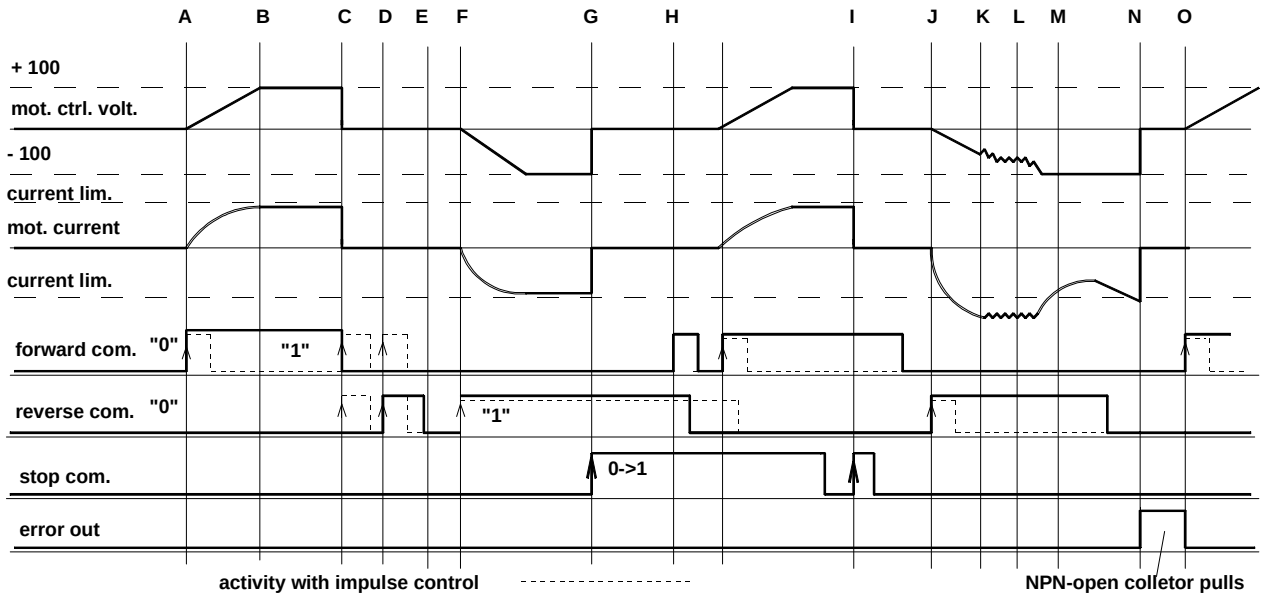

Fig 4 - thermal protection

SPECIAL situation (Fig.4) with thermal protection activated. When thermal protection activates (t >120°C), motor stops and error output starts to blink at 1Hz. The controller will execute new commands only when the temperature of the controller goes down to 115°C. At this point also the error output will stop blinking. In order to execute a new command, command inputs must first be set to zero.

# TR-EM-208 TIMING CHART

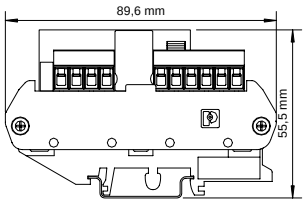
A: Normal start with forward command. Motor voltage will rise along accel.-ramp (ramp time A->B adjustable 0-3s).
C: Command aborted, motor voltage drops, motor runs freely during free deceleration C->E (time adjustable 0-3s).
New commands (D) won't affect the operation. After free deceleration, the controller will switch to braking at point E, in other words motor poles will be short circuited (braking).
With impulse control either "new" command will stop. During C->E new impulses will not activate a start.
F: Start with reverse command.
G: Stop input changes 0->1 and stops the motor. Motor will remain in this condition until a new command is assigned. Start condition setting applies to this moment, restart can be activated in both directions or only in reverse direction.
H: New start attempt, if old command is still on, new command will not be executed. When old command exits, new command must first be set to zero before it will be executed.
Notice that new stop command will activate only after stop is first set to zero, in other words changed 0->1 at point I.

J: Start, in which motor will exceed current limit already during acceleration ramp J->L, at point K current is 1.5 times adjusted current. Controller starts to limit motor current by limiting control voltage.
L: Settling time L->M (constant 0.5s), motor current is still being limited. During this time, if motor current will not decrease to current limit range, the controller will switch off motor voltage.
N: If motor current exceeds set limit after acceleration and settling time, control will be switched off as in point N. Motor will be stopped and error output and led will be activated.
O: After over current switch off, restart is possible either in both directions or with only reverse control, see start conditions on first page. Restart resets error output and led.
! Activity with continuous control mode is illustrated with solid line.
! Activity with impulse control mode is illustrated with dashed line.

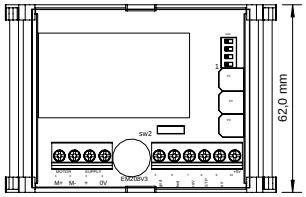


# TR-EM-208 Housing options

## TR-EM-208-R

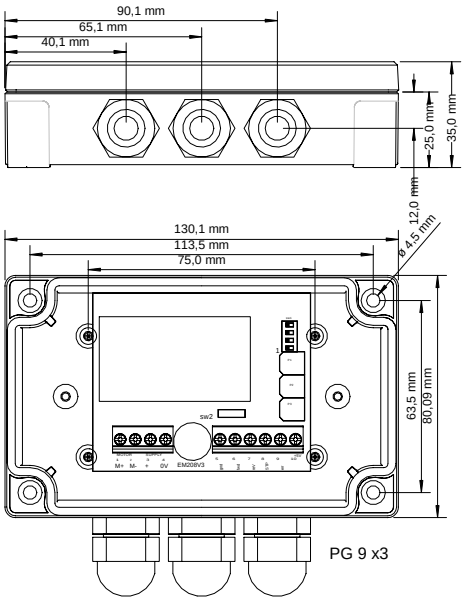



Fits to 35 mm DIN-rail or C-rail.




Phoenix Contact UM 72 profile rail base

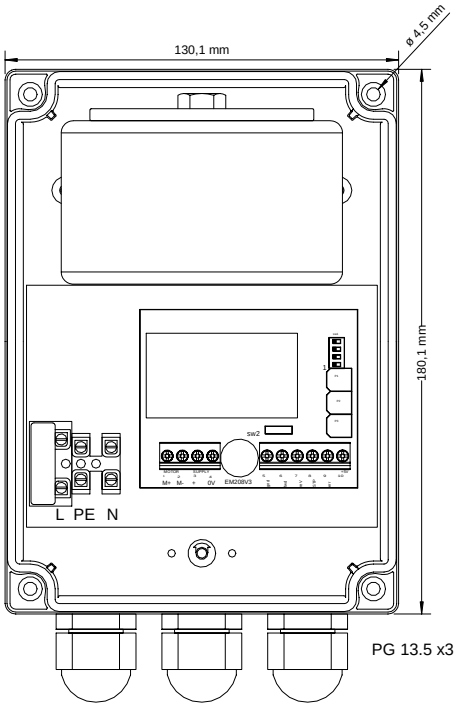
## TR-EM-208-H

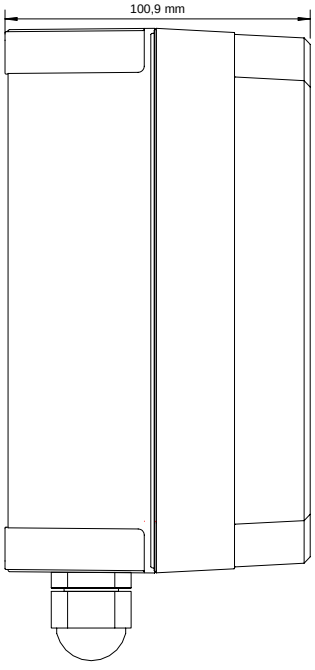



Fibox PC100/35LG IP66 housing

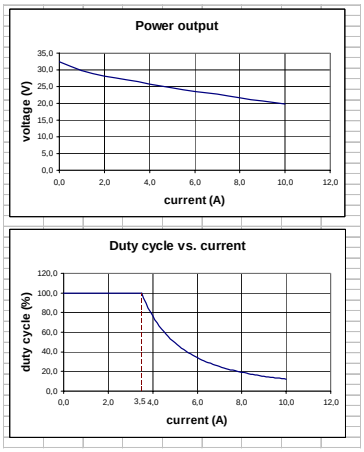
## TR-EM-208-T-230

(TR-EM-000-T-230)




Fibox PC150/100HG IP66 housing




Technical data

| | |
|---|---|
| Supply voltage | 230 Vac |
| Fuse | T1.6A / 20.0 x 5.0 mm |
| Transformer | 230 / 22 Vac / 150 VA<br>Max output 10 A<br>(12% duty cycle),<br>continuous 3.5 A |
| Filtering | 8800 uF |
| Weight | 2.4 kg |

Product is EMC-tested and CE-marked.