TECHLINE®
IMPROVING FLEXIBILITY

Actuator LA37
Data sheet

LINAK®
WE IMPROVE YOUR LIFE

LINAK.COM/TECHLINE

LA37

Tough applications require equally tough actuator solutions. The actuator LA37 is specifically developed for heavy-duty applications in harsh environments, where there is a need for high lifting capacity and holding force. The LA37 offers the well-known LINAK quality, guaranteeing you a maintenance-free product with a long lifetime.

IC INTEGRATED CONTROLLER

This **TECHLINE®** actuator comes with IC - Integrated controller.
For more information on our IC options, please see: www.linak.com/techline

Features:
- 12 or 24 V DC permanent magnetic motor
- Thrust from 10,000N - 15,000N
- Static holding force up to 70 kN in push and pull
- Dynamic wind stress forces 15 kN push/pull 100,000 times
- Max. speed 7 mm/sec. depending on load and spindle pitch
- Stroke length from 100 mm to 600 mm (Trunnion mounted: 500, 750 and 1,000 mm)
- Built-in endstop switches
- Non rotating piston rod eye
- Protection class: IP66 (dynamic) and IP69K (static)

Options in general:
- Different back fixtures and piston rod eyes
- Trunnion mounting
- Exchangeable cables in different lengths
- Hall effect sensor
- IC options including:
  - IC - Integrated Controller
  - Integrated Parallel Controller
  - Modbus, LIN bus and CAN bus communication
  - Analogue or digital feedback for precise positioning
  - Endstop signals
  - PC configuration tool

Usage:
- Duty cycle is max. 10%
- Ambient operating temperature -30°C to +70°C, full performance from +5°C to +40°C

Contents

Chapter 1

Specifications

Motor:	Permanent magnet motor 12 or 24V DC*
Cable:	Motor: 2 x 14 AWG PVC cable Control: 6 x 20 AWG PVC cable **
Brake:	Integrated brake ensures a high self-locking ability. The brake is deactivated when the actuator is powered in order to obtain a high efficiency
Hand crank:	As a standard feature the actuator can be operated manually
Housing:	The housing is made of casted aluminium, coated for outdoor use and in harsh conditions
Spindle part:	Outer tube: Extruded aluminium anodised Inner tube: Stainless steel AISI304/SS2333 Acme spindle: Trapezoidal spindle with high efficiency
Temperature range:	- 30° C to +70° C - 22° F to +158° F Full performance +5° C to +40° C
Storage temperature:	-55°C to +105°C
Weather protection:	Rated IP66 for outdoor use. Furthermore, the actuator can be washed down with a high-pressure cleaner (IP69K).
Noise level:	73dB (A) measuring method DS/EN ISO 8746 actuator not loaded.

* 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.

Be aware of the following two symbols throughout this product data sheet:

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.

Technical specifications

LA37 with 12 V motor

Order number	Push max. (N)	Pull max. (N)	**Self-locking min. (N) Push*	Self-locking min. (N) Pull	Pitch (mm/spindle rev.)	*Typical speed (mm/s) load		Standard stroke lengths (mm)	*/***Typical amp. (A)	
						no	full		No load	Full load
371CXXX1XXXX1XX	15000	15000	20000	20000	2.5	3.2	3	100-400	4.5	22.5
372CXXXXXXXX1XX	10000	10000	15000	15000	8	10	7	100-600	4.5	23

LA37 with 24 V motor

Order number	Push max. (N)	Pull max. (N)	**Self-locking-min. (N) Push*	Self-locking min. (N) Pull	Pitch (mm/spindle rev.)	*Typical speed (mm/s) load		Standard stroke lengths (mm)	*/***Typical amp. (A)	
						no	full		No load	Full load
371CXXX1XXXX2XX	15000	15000	20000	20000	2.5	3.2	3	100-400	2.2	10.0
371CXXXAXXXX2XX	10000	10000	20000	20000	2.5	3.2	3	400-600	2.2	8.0
372CXXXXXXXX2XX	10000	10000	15000	15000	8	10	7	100-600	2.2	11

LA37 with 12 V motor - Trunnion mounted

Order number	Push max. (N)	Pull max. (N)	**Self-locking-min. (N) Push*	Self-locking min. (N) Pull	Pitch (mm/spindle rev.)	*Typical speed (mm/s) load		Standard stroke lengths (mm)	*/***Typical amp. (A)	
						no	full		No load	Full load
371C0XXXXXXX1XX	15000	15000	20000	20000	2.5	3.2	3	500, 750,1000	4.5	22.5

LA37 with 24 V motor - Trunnion mounted

Order number	Push max. (N)	Pull max. (N)	**Self-locking-min. (N) Push*	Self-locking min. (N) Pull	Pitch (mm/spindle rev.)	*Typical speed (mm/s) load		Standard stroke lengths (mm)	*/***Typical amp. (A)	
						no	full		No load	Full load
371C0XXXXXXX2XX	15000	15000	20000	20000	2.5	3.2	3	500, 750,1000	2.2	10.0

* The typical values can have a variation of ± 20% on the current values and ± 10% on the speed values.
Measurements are made with an actuator in connection with a stable power supply and an ambient temperature at 20°C.

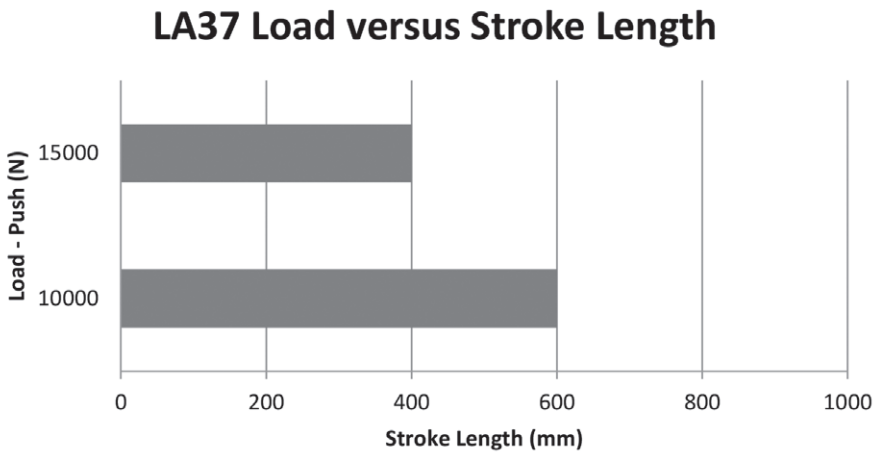
** Depending on stroke length in push

*** Depending on temperature - see speed and current curves

- **Self locking ability**
  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.

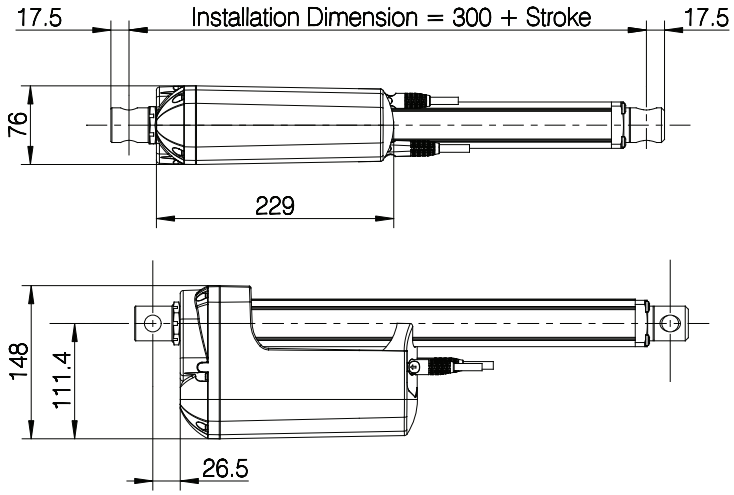
- When using soft stop on a DC-motor, a short peak of higher voltage will be sent back towards the power supply. It is important when selecting the power supply that it does not turn off the output, when this backwards load dump occurs.

Load versus stroke length



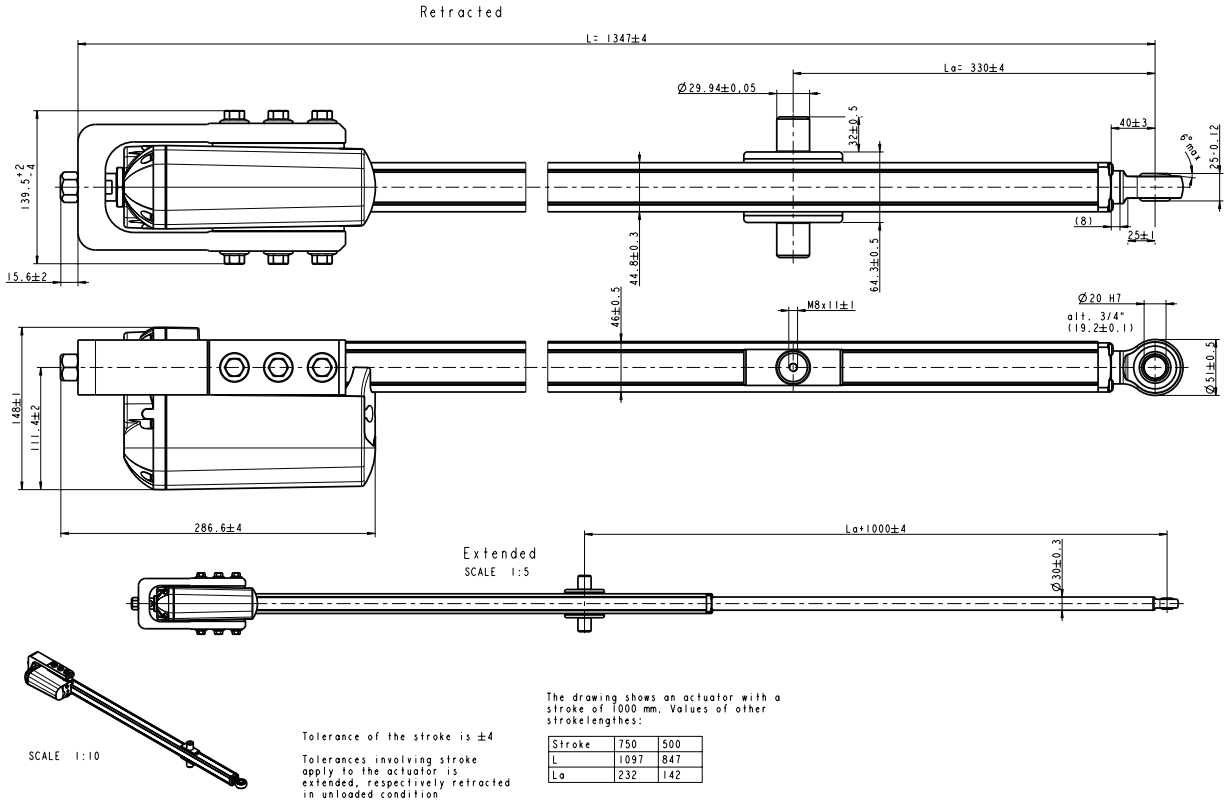
- For applications that only operate in pull the limitations are 600 mm stroke and 15,000 N load.
- Safety factor 2.

LA37 Dimensions



The above dimensions apply for all piston rod eyes and back fixtures.

LA37 Dimensions - Trunnion mounted



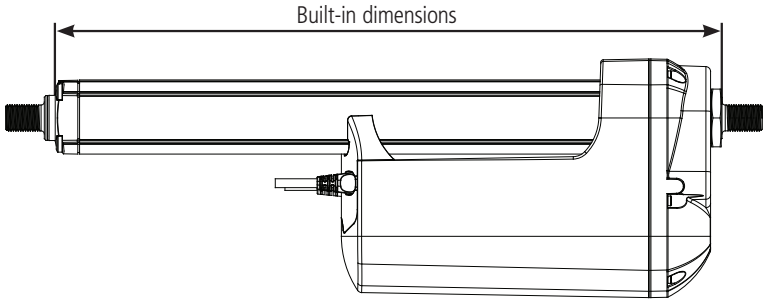
The above dimensions apply for all piston rod eyes.

Built-in dimensions

The built-in dimension depends upon the chosen safety option and stroke length(s).

Piston rod	"0" / to the centre of the hole	"1" / to the centre of the hole	"2" / to the centre of the hole	"3" / to the centre of the hole	"4" / from the surface	"5" / from the surface
Back fixture	Stroke from 100 to 600	Stroke from 100 to 600	Stroke from 100 to 600	Stroke from 100 to 600	Stroke from 100 to 600	Stroke from 100 to 600
"0" / from the surface	Trunnion mounting	Trunnion mounting	Trunnion mounting	Trunnion mounting	Trunnion mounting	Trunnion mounting
"1" and "2" / to the centre of the hole	316 + s	316 + s	300 + s	300 + s	287 + s	287 + s
"3" and "4" / to the centre of the hole	316 + s	316 + s	300 + s	300 + s	287 + s	287 + s
"5" / from the surface	296 + s	296 + s	281 + s	281 + s	267 + s *	267 + s *

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

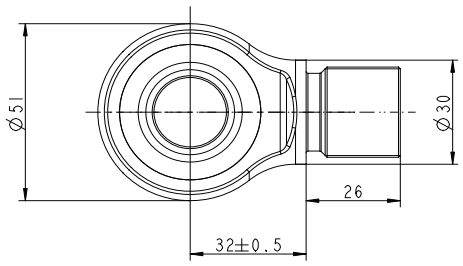


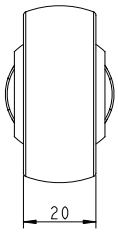
Stroke and built-in tolerances

End stop options E.g. 37XXXX+?XXXXXXX	**Descriptions**	**Stroke tolerance**	**Example for 200 mm stroke**	**BID tolerance**	**Example for 200 mm BID**
? = 0	Without endstop switches Mechanical endstop	+/- 2 mm	198 to 202mm	+/- 2mm	198 to 202 mm
? = 1, 2	With built-in limit switches	+0/-4 mm	196 to 200mm	+/- 4mm	196 to 204 mm
? = 7, 8, 9, A, B	Integrated controller Modbus Linbus	+0/-6 mm	194 to 200mm	+/- 4mm	196 to 204 mm

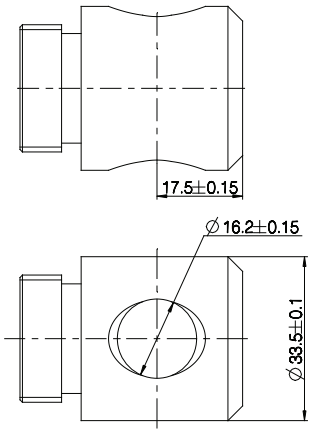
LA37 Piston Rod Eyes

Option "0&1"
LINAK P/N: 0361568
AISI 304

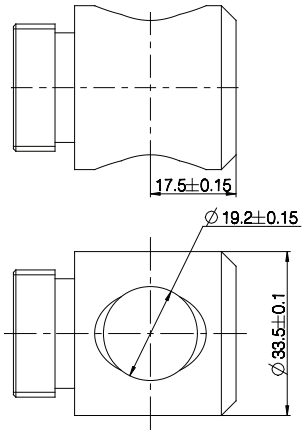




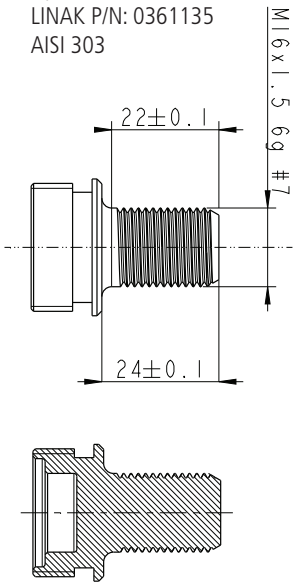
Option "2"
LINAK P/N: 0361387
Free cutting steel galvanised surface



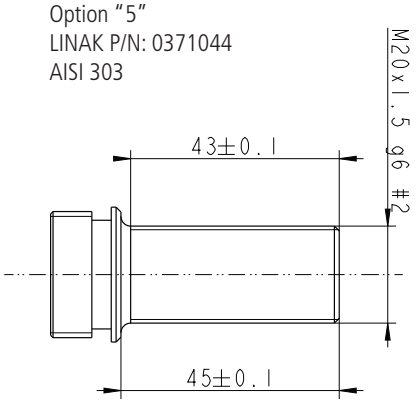
Option "3"
LINAK P/N: 0361393
Free cutting steel galvanised surface

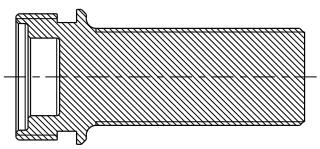


Option "4"
LINAK P/N: 0361135
AISI 303



Option "5"
LINAK P/N: 0371044
AISI 303

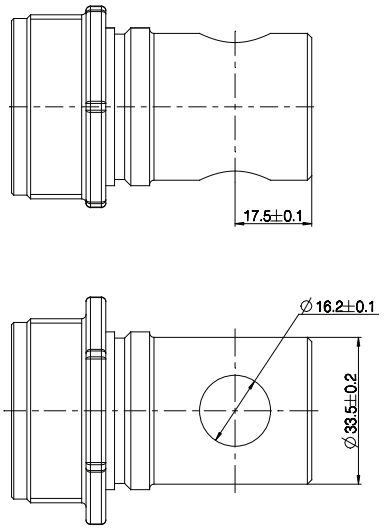




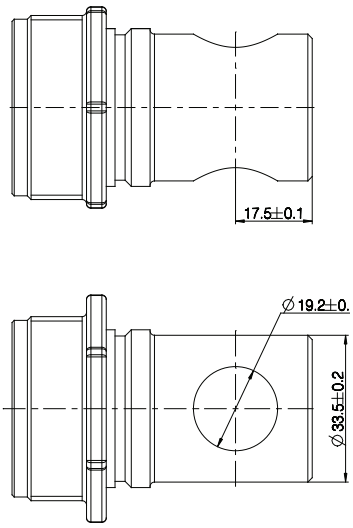
The Piston Rod Eye is only allowed to turn 0 - 90 degrees.

LA37 Back fixtures

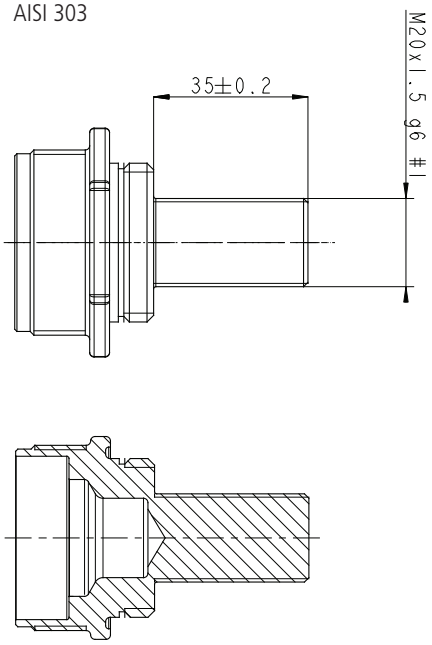
Option "1&2"
LINAK P/N: 0371019
Free cutting steel galvanised surface



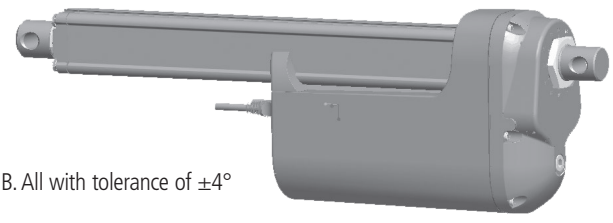
Option "3&4"
LINAK P/N: 0371040
Free cutting steel galvanised surface



Option "5"
LINAK P/N: 0371247
AISI 303

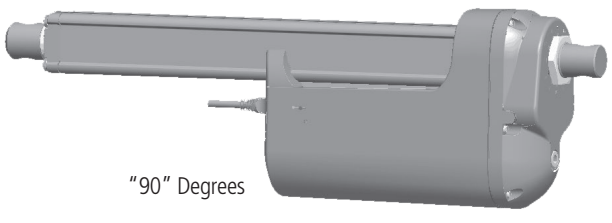


LA37 Back fixture orientation



NB. All with tolerance of ±4°

"0" Degrees



"90" Degrees

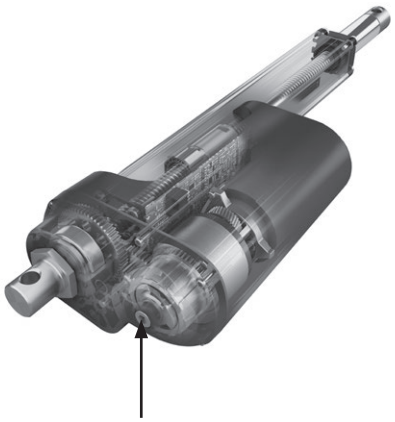
Manual Hand Crank

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: Max.16 Nm (at maximum load)

Piston Rod movement per turn: Gear C = 4.0 mm

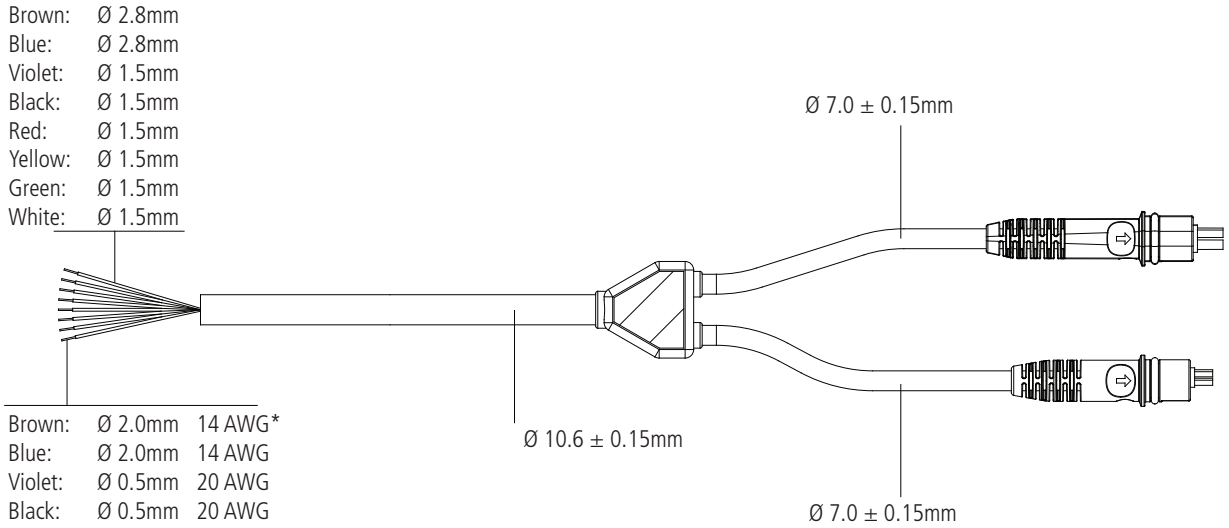


6 mm Allen Key
(With stainless steel screws: 5 mm Allen Key)

- 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.
- Actuators with absolute positioning must be initialised after use of the manual handcrank, because their positioning will be displaced when the power is disconnected.

Cable dimensions

Y-cable dimensions:

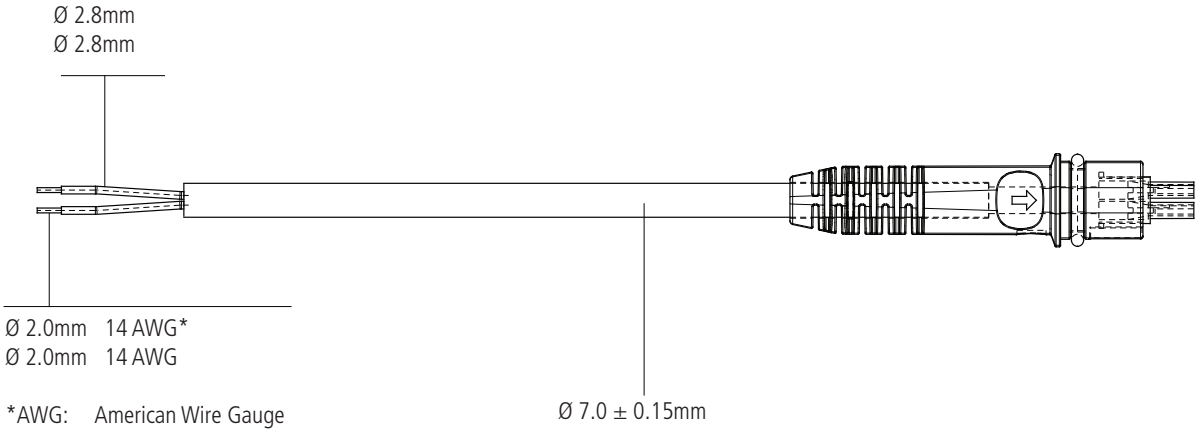


Brown:	Ø 2.0mm	14 AWG*
Blue:	Ø 2.0mm	14 AWG
Violet:	Ø 0.5mm	20 AWG
Black:	Ø 0.5mm	20 AWG
Red:	Ø 0.5mm	20 AWG
Yellow:	Ø 0.5mm	20 AWG
Green:	Ø 0.5mm	20 AWG
White:	Ø 0.5mm	20 AWG

*AWG: American Wire Gauge

Cable dimensions

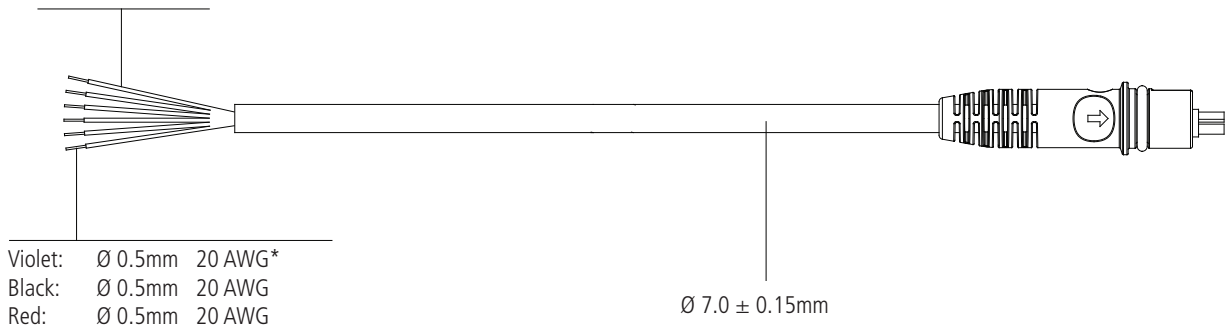
Power cable dimensions:



*AWG: American Wire Gauge

Signal cable dimensions:

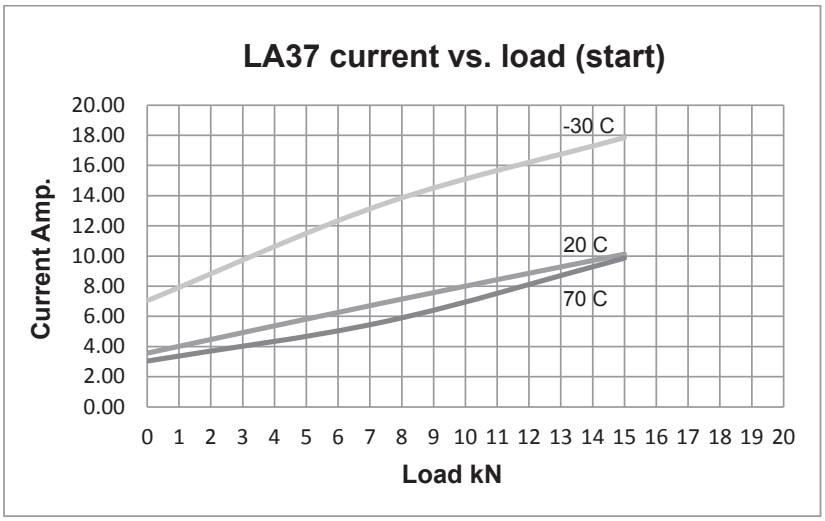
Violet:	Ø 1.5mm
Black:	Ø 1.5mm
Red:	Ø 1.5mm
Yellow:	Ø 1.5mm
Green:	Ø 1.5mm
White:	Ø 1.5mm

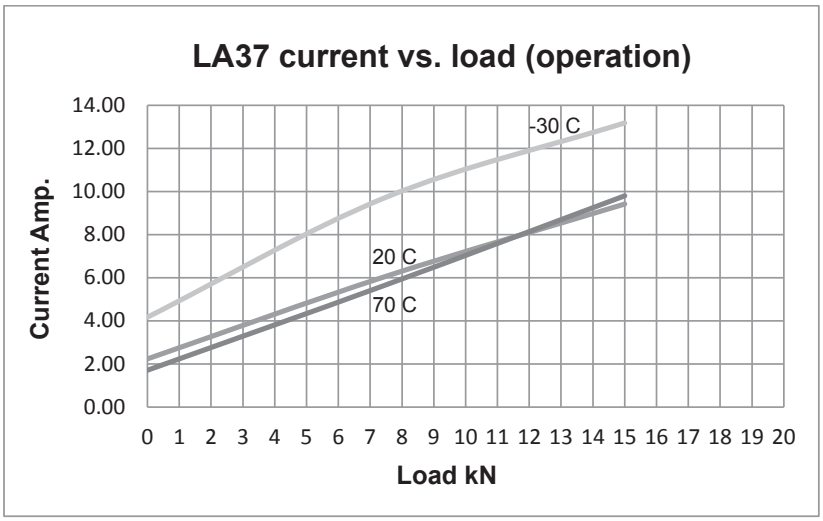


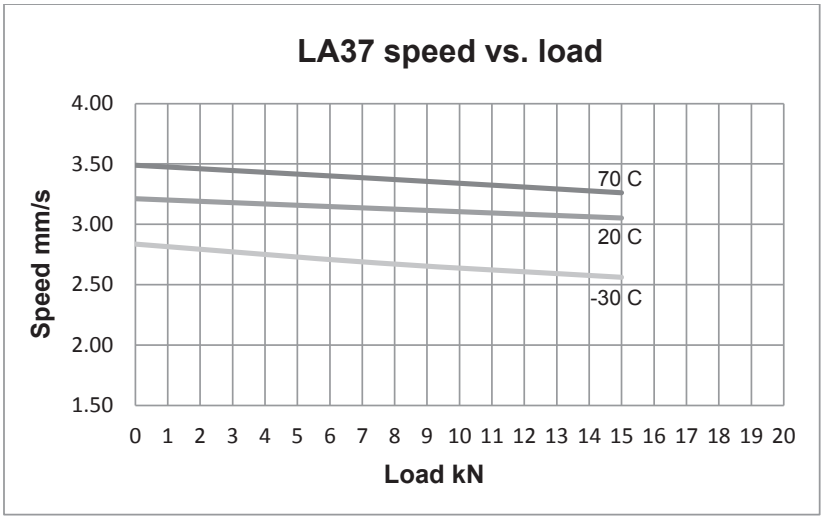
*AWG: American Wire Gauge

Speed and current curves

The values below are typical values and made with a nominal power supply of 24V DC and an ambient temperature of 20˚C.





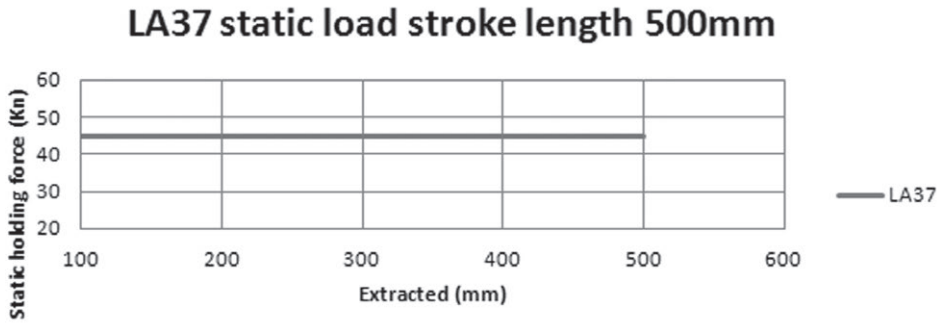


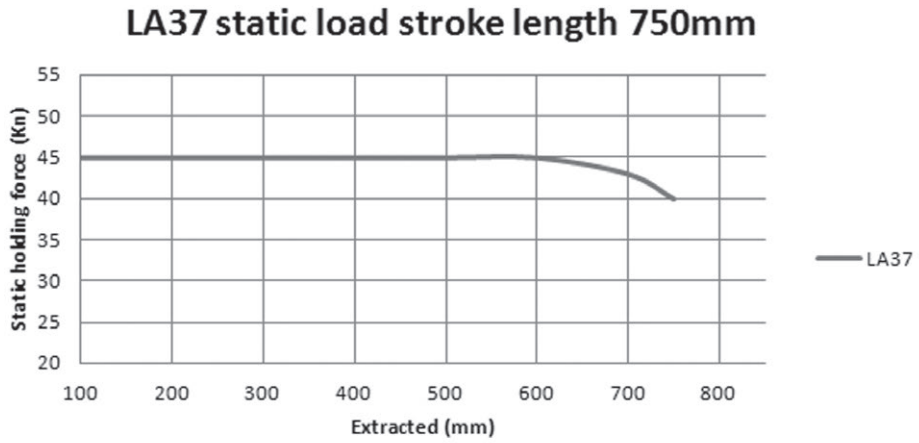
Speed and current tables

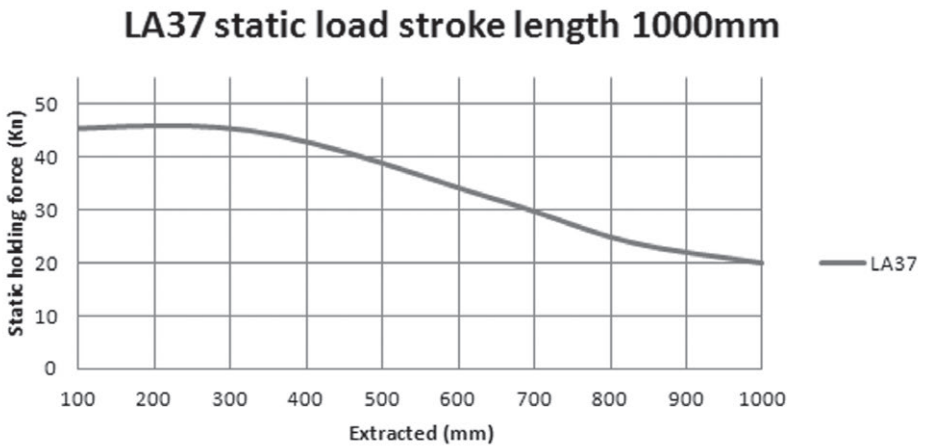
Temp	Force	Speed	
Temp. C °	Force in push/kN	Average	Std. dev.
20	0	3.31	0.03
	7.5	2.87	0.02
	15	2.51	0.04
-30	0	2.94	0.04
	7.5	2.40	0.04
	15	2.06	0.07
70	0	3.58	0.02
	7.5	3.07	0.05
	15	2.55	0.08

Temp	Force	Amp start (24V)		Amp operation (24V)	
Temp. C °	Force in push/kN	Average	Std. dev.	Average	Std. dev.
20	0	3.57	0.20	2.23	0.14
	7.5	6.93	0.22	6.07	0.30
	15	10.13	0.38	9.42	0.61
-30	0	7.03	2.19	4.17	0.37
	7.5	13.50	0.53	9.73	0.26
	15	17.85	1.55	13.18	0.48
70	0	3.03	0.38	1.70	0.09
	7.5	5.67	0.27	5.67	0.27
	15	9.87	0.63	9.80	0.54

Load and stroke curves - Trunnion mounted







Chapter 2

I/O specifications: Actuator without feedback

Input/Output	Specification	Comments
Description	Permanent magnetic DC motor.	
Brown	12 or 24VDC (+/-) 12V ± 20% 24V ± 10% Under normal conditions: 12V, max. 26A depending on load 24V, max. 13A depending on load	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue		To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
Red	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	

I/O specifications: Actuator with endstop signal output

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

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

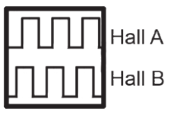
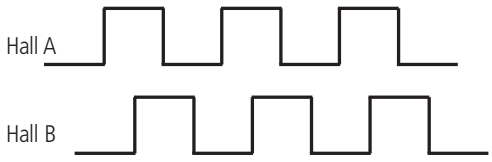
<table>
<tr><th>Input/Output</th><th colspan="2">Specification</th><th>Comments</th></tr>
<tr><td>Description</td><td colspan="2">The actuator can be equipped with Dual Hall that gives a relative positioning feedback signal when the actuator moves.</td><td> 
</td></tr>
<tr><td>Brown</td><td colspan="2" rowspan="2">12 or 24VDC (+/-)
12V ± 20%
24V ± 10%
Under normal conditions:
12V, max. 26A depending on load
24V, max. 13A depending on load</td><td>To extend actuator:
Connect Brown to positive
To retract actuator:
Connect Brown to negative</td></tr>
<tr><td>Blue</td><td>To extend actuator:
Connect Blue to negative
To retract actuator:
Connect Blue to positive</td></tr>
<tr><td>Red</td><td colspan="2">Signal power supply (+)
12-24VDC</td><td rowspan="2">Current consumption:
Max. 40mA, also when the actuator is not running</td></tr>
<tr><td>Black</td><td colspan="2">Signal power supply GND (-)</td></tr>
<tr><td>Green</td><td>Hall B</td><td rowspan="2">Movement per single hall pulse:
LA371C Actuator = 0.4 mm per pulse</td><td rowspan="2">The Hall sensor signals are generated by the turning of the actuator gearing.
These signals can be fed into a PLC (Programmable Logic Controller). In the PLC the quadrature signals can be used to register the direction and position of the piston rod.
Output voltage min. V_{IN} - 2V
Current output 12mA
Overvoltage on the motor can result in shorter pulses.
N.B. For more precise measurements, please contact LINAK A/S.</td></tr>
<tr><td>Yellow</td><td>Hall A</td></tr>
<tr><td>Violet</td><td colspan="2">Endstop signal in</td><td rowspan="2">Output voltage min. V_{IN} - 2V
Source current max. 30mA
NOT potential free</td></tr>
<tr><td>White</td><td colspan="2">Endstop signal out</td></tr>
<tr><td>Diagram of Dual Hall:</td><td colspan="3"> 

Fig. 1</td></tr>
</table>

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

<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.</td><td> 
</td></tr>
<tr><td>Brown</td><td rowspan="2">12 or 24VDC (+/-)
12V ± 20%
24V ± 10%

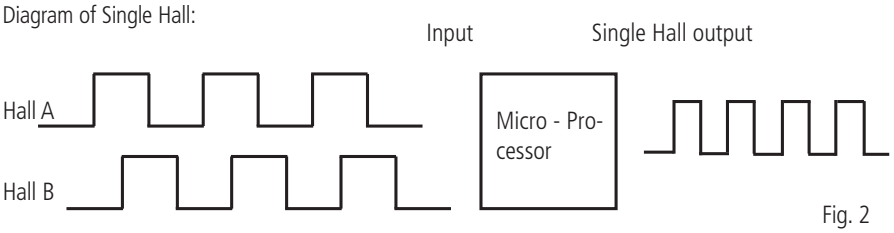
Under normal conditions:
12V, max. 26A depending on load
24V, max. 13A depending on load</td><td>To extend actuator:
Connect Brown to positive
To retract actuator:
Connect Brown to negative</td></tr>
<tr><td>Blue</td><td>To extend actuator:
Connect Blue to negative
To retract actuator:
Connect Blue to positive</td></tr>
<tr><td>Red</td><td>Signal power supply (+)
12-24VDC</td><td rowspan="2">Current consumption:
Max. 40mA, also when the actuator is not running</td></tr>
<tr><td>Black</td><td>Signal power supply GND (-)</td></tr>
<tr><td>Green</td><td>Endstop signal out</td><td rowspan="2">Output voltage min. V_{IN} - 2V
Source current max. 100mA
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)
Movement per Single Hall pulse:
LA371C: Actuator = 0.1372 mm per count
Frequency:
Frequency is 14-26 Hz on Single Hall output depending on load.
Overvoltage on the motor can result in shorter pulses.</td><td>Output voltage min. V_{IN} - 2V
Max. current output: 12mA
Max. 680nF
N.B. For more precise measurements, please contact
LINAK A/S.
Low frequency with a high load.Higher frequency with no load.</td></tr>
<tr><td colspan="2">Diagram of Single Hall:
 

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

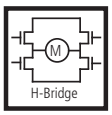
I/O specifications: Actuator with endstop signals and absolute positioning - Analogue feedback

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

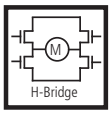
I/O specifications: Actuator with endstop signals and absolute positioning - PWM

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

I/O Specifications: Actuator with IC Basic

Input/Output	Specification	Comments
Description	Easy to use interface with integrated power electronics (H-bridge). The actuator can also be equipped with electronic circuit that gives an absolute or relative feedback signal. The version with "IC option" cannot be operated with PWM (power supply).	
Brown	12-24VDC + (VCC) Connect Brown to positive 12V ± 20% 24V ± 10% 12V, current limit 25A 24V, current limit 13A	Note: Do not change the power supply polarity on the brown and blue wires! Power supply GND (-) is electrically connected to the housing If the temperature drops below 0°C, all current limits will automatically increase to 30A
Blue	12-24VDC - (GND) Connect Blue to negative 12V ± 20% 24V ± 10% 12V, current limit 25A 24V, current limit 13A	
Red	Extends the actuator	On/off voltages: > 67% of V_{IN} = ON < 33% of V_{IN} = OFF Input current: 10mA
Black	Retracts the actuator	
Green	Not to be connected	
Yellow	Not to be connected	
Violet	Analogue feedback 0-10V (Option 7.2)	Standby power consumption: 12V, 60mA 24V, 45 mA Ripple max. 200mV Transaction delay 20ms Linear feedback 0.5% Max. current output: 1mA It is recommendable to have the actuator to activate its limit switches on a regular basis, to ensure more precise positioning
	Single Hall output (PNP) (Option 7.1) Movement per Single Hall pulse: LA371C: Actuator = 0.1372 mm per count Frequency: Frequency is 14-26 Hz on Single Hall output depending on load. Overvoltage on the motor can result in shorter pulses	Output voltage min. V_{IN} - 2V Max. current output: 12mA Max. 680nF
White	Signal GND	

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

Input/Output	Specification	Comments
Description	Easy to use interface with integrated power electronics (H-bridge). The actuator can also be equipped with electronic circuit that gives an absolute or relative feedback signal. IC Advanced provides a wide range of possibilities for customisation. The version with "IC option" cannot be operated with PWM (power supply).	
Brown	12-24VDC + (VCC) Connect Brown to positive 12V ± 20% 24V ± 10% 12V, current limit 25A 24V, current limit 13A	Note: Do not change the power supply polarity on the brown and blue wires! Power supply GND (-) is electrically connected to the housing Current limit levels can be adjusted through BusLink If the temperature drops below 0°C, all current limits will automatically increase to 30A
Blue	12-24VDC - (GND) Connect Blue to negative 12V ± 20% 24V ± 10% 12V, current limit 25A 24V, current limit 13A	
Red	Extends the actuator	On/off voltages: > 67% of V_{IN} = ON < 33% of V_{IN} = OFF Input current: 10mA
Black	Retracts the actuator	
Green	Endstop signal out	Output voltage min. V_{IN} - 2V Source current max. 100mA Endstop signals are NOT potential free. Endstop signals can be configured with BusLink software according to any position needed When configuring virtual endstop, it is not necessary to choose the position feedback EOS and virtual endstop will work even when feedback is not chosen
Yellow	Endstop signal in	

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

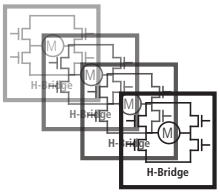
Input/Output	Specification	Comments
Violet	Analogue feedback (0-10V): Configure any high/low combination between 0-10V	Ripple max. 200mV Transaction delay 20ms Linear feedback 0.5% Max. current output. 1mA
	Single Hall output (PNP) Movement per Single Hall pulse: LA371C: Actuator = 0.1372 mm per count Frequency: Frequency is 14-26 Hz on Single Hall output depending on load. Overvoltage on the motor can result in shorter pulses	Output voltage min. V_{IN} - 2V Max. current output: 12mA Max. 680nF
	Digital output feedback PWM: Configure any high/low combination between 0-100%	Output voltage min. V_{IN} - 2V Frequency: 75Hz ± 10Hz as standard, but this can be customised. Duty cycle: Any low/high combination between 0 and 100 percent. Open collector source current max. 12mA
	Analogue feedback (4-20mA): Configure any high/low combination between 4-20mA	Tolerances +/- 0.2mA Transaction delay 20ms Linear feedback 0.5% Output: Source Serial resistance: 12V max. 300 ohm 24V max. 900 ohm
	All absolute value feedbacks (0-10V, PWM and 4-20mA)	Standby power consumption: 12V, 60mA 24V, 45mA It is recommendable to have the actuator to activate its limit switches on a regular basis, to ensure more precise positioning
White	Signal GND	

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

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

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

I/O specifications: Actuator with Parallel

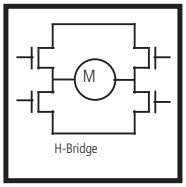
Input/Output	Specification	Comments
Description	Parallel drive of up to 8 actuators. A master actuator with an integrated H-bridge controller controls up to 7 slaves. The version with "IC option" cannot be operated with PWM (power supply).	
Brown	12-24VDC + (VCC) Connect Brown to positive 12V ± 20% 24V ± 10% 12V, current limit 25A 24V, current limit 13A	Note: Do not change the power supply polarity on the brown and blue wires! The parallel actuators can run on one OR separate power supplies Power supply GND (-) is electrically connected to the housing Current limit levels can be adjusted through BusLink (only one actuator at a time for parallel) If the temperature drops below 0°C, all current limits will automatically increase to 30A
Blue	12-24VDC - (GND) Connect Blue to negative 12V ± 20% 24V ± 10% 12V, current limit 25A 24V, current limit 13A	
Red	Extends the actuator	On/off voltages: > 67% of V_{IN} = ON < 33% of V_{IN} = OFF Input current: 10mA It does not matter where the in/out signals are applied. You can either choose to connect the signal cable to one actuator OR you can choose to connect the signal cable to each actuator on the line. Either way this will ensure parallel drive
Black	Retracts the actuator	
Green	Endstop signal out	Output voltage min. V_{IN} - 2V Source current max. 100mA Endstop signals are NOT potential free. Endstop signals can be configured with BusLink software according to any position needed
Yellow	Endstop signal in	
Violet	Parallel communication: Violet cords must be connected together	Standby power consumption: 12V, 60mA 24V, 45mA No feedback available during parallel drive
White	Signal GND: White cords must be connected together	

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

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

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

I/O specifications: Actuator with CAN bus

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. See the LINAK CAN bus user manual. Actuator identification is provided, using standard J1939 address claim or fixed addresses. See connection diagram, fig. 14, page 58	
Brown	12-24VDC + (VCC) Connect Brown to positive 12V ± 20% 24V ± 10% 12V, current limit 25A 24V, current limit 13A	Note: Do not swap the power supply polarity on the brown and blue wires! Power supply GND (-) is electrically connected to the housing Current limit levels can be adjusted through BusLink If the temperature drops below 0°C, all current limits will automatically increase to 30A
Blue	12-24VDC - (GND) Connect Blue to negative	
Red	Extends the actuator	On/off voltages: > 67% of V_{IN} = ON < 33% of V_{IN} = OFF
Black	Retracts the actuator	
Green	CAN_L	LA37 with CAN bus does not contain the 120Ω terminal resistor. The physical layer is in accordance with J1939-15.* Speed:Baudrate: 250 kbps Max bus length: 40 meters Max stub length: 3 meters Max node count: 10 (can be extended to 30 under certain circumstances) Wiring: Unshielded twisted pair 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 LA37 CAN do not comply with this.

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

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

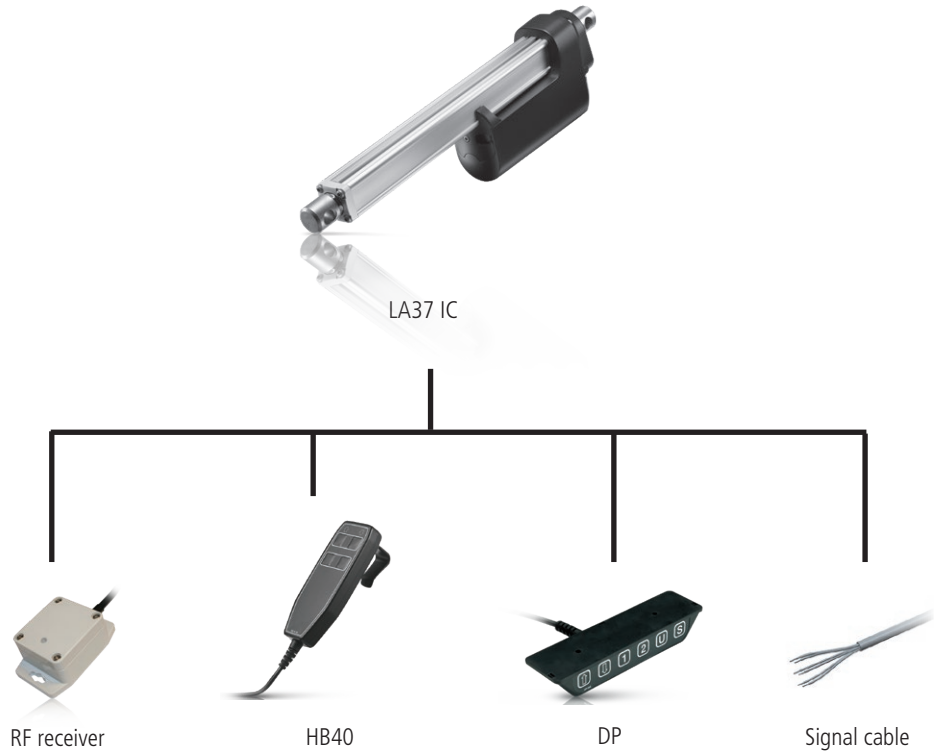
	Pre-configured	Customised range	Pros	Cons
None			N/A	N/A
PWM Feedback	10 – 90 % 75 Hz	0 – 100 % 75 – 150 Hz	Suitable for long distance transmission. Effectual immunity to electrical noise.	More complex processing required, compared to AFV and AFC.
Single Hall*	N/A	N/A	Suitable for long distance transmission.	No position indication.
Analogue Feedback Voltage (AFV)*	0 - 10V	Any combination, going negative or positive. E.g. 8.5 – 2.2V over a full stroke.	High resolution. Traditional type of feedback suitable for most PLCs. Easy faultfinding. 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. E.g. 5.5 – 18mA over a full stroke.	High resolution. Better immunity to long cables and differences in potentials than AFV. Provides inherent error condition detection. Independent on stroke length, compared to a traditional mechanical potentiometer.	Not suitable for signal isolation.
Endstop signal in/out**	At physical end stops. Default for IC Advanced.	Any position.	Can be set at any position over the full stroke length.	Only one endstop can be customised.

All feedback configurations are available for IC Advanced.
* IC Basic feedback configurations available: Single Hall and 0-10V
** Parallel feedback configurations available: EOS

Actuator configurations available for IC Basic, IC Advanced and Parallel

	Pre-configured	Customised range	Description
Current limit inwards	20A for both current limit directions. (When the current outputs are at zero, it means that they are at maximum value 20A). Be aware: 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. 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 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. The inwards and outwards current limits can be configured separately and do not have to have the same value.
Current limit outwards			
Max. speed inwards/ outwards	100% equal to full performance. Please note: for parallel actuators the full performance equals 80% of the max. speed.	Lowest recommended speed at full load: 60% 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	0mm for both virtual enstop directions. (When the virtual end-stops 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.	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.
Virtual endstop outwards			
Soft stop inwards	0.3 sec. for both soft stop directions.	0.3 sec. to 30 sec. 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). 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. 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			

System combination possibilities for LA37 IC Advanced



Chapter 3

Environmental tests – Climatic

Test	Specification	Comment
Cold test	EN60068-2-1 (Ab)	Storage at low temperature: Temperature: -40°C Duration: 72h Not connected Tested at room temperature.
	EN60068-2-1 (Ad)	Storage at low temperature: Temperature: -30°C Duration: 2h Actuator is not activated/connected Tested at low temperature.
Dry Heat	EN60068-2-2 (Bb)	Storage at high temperature: Temperature: +90°C Duration: 72h Actuator is not activated/connected. Tested at room temperature Storage at high temperature: Temperature: +70ºC Duration: 1000h Actuator is not activated/connected Tested at high temperature.
	EN60068-2-2 (Bd)	Operating at high temperature: Temperature: +60°C Int. max. 17% Duration:700h Actuator is activated Tested at high temperature.
Change of temperature	EN60068-2-14 (Na)	Rapid change of temperature: High temperature: +100°C in 60 minutes. Low temperature: -30°C in 60 minutes. Transition time:<10 seconds Duration: 100 cycles Actuator is not activated/connected. Tested at room temperature.
	EN60068-2-14 (Nb)	Controlled change of temperature: Temperature change 5°C pr. minute High temperature: +70°C in 60 minutes. Low temperature: -30°C in 30 minutes. 130 minutes pr. Cycle. Duration: 1,000 cycles (90days) Actuator is not activated/connected. Tested at 250, 500 and 1,000 cycles at low and high temperatures.
Damp heat	EN60068-2-30 (Db)	Damp heat, Cyclic: Relative humidity: 93-98% High temperature: +55°C in 12 hours Low temperature: +25°C in 12 hours Duration: 21cycles * 24hours Actuator is not activated/connected Tested within 1 hour after condensation, That means after upper temperature has been reached.
	EN60068-2-3 (Ca)	Damp heat, Steady state: Relative humidity: 93-95% Temperature: +40 ±2°C Duration: 56 days Actuator is not activated/connected. Tested within one hour after exposure.
Salt spray test		Actuators are tested for corrosion resistance at 500 hours salt spray test.

Environmental tests – Climatic

Degrees of protection protection IPX6 static		IPX6 static: Actuators are tested for water ingress according to IPX6, without movement. IPX4 dynamic: Actuators are tested in rainy conditions with movement. IP6X: Actuators are tested for dust sealing properties according to IP6X.
Chemicals	BS7691 / 96hours	Diesel 100% Hydraulic oil 100% Ethylene Glucol 50% Urea Nitrogen saturated solution Liquid lime 10% (Super- Cal) NPK Fertilizer (NPK 16-4-12) saturated Tested for corrosion.
Climate test with Modbus pcb		Actuators with Modbus pcb are tested with 10,000N load, at temperatures of plus 5ºC and plus 40ºC.
Climate test with Hall pcb		Actuators with Hall pcb are tested with 15,000N load, at temperatures of minus 30ºC and plus 70ºC.

Environmental tests - Mechanical

Test	**Specification**	**Comment**
Free fall		Free fall from all sides: Height of fall: 0.4 meter onto steel. Actuator not activated/connected.
Vibration	EN60068-2-36 (Fdb) EN 60068-2-6 (Fc)	Random vibration: Short time test:6.29 g RMS Actuator is not connected Long time test: 7.21 g RMS Actuator is not connected Duration: 2 hours in each direction Sinus vibration: Frequency 5-25 Hz: Amplitude = 3.3 mm pp Frequency 25-200 Hz: Acceleration 4 g Number of directions: 3 (X-Z-Y) Duration: 2 hours in each direction. Actuator is not activated
Bump	EN60068-2-29 (Eb)	Bump test: Level: 40 g Duration: 6 milliseconds Number of bumps: 500 shocks in each of 6 directions. Actuator is not connected.
Shock	EN60068-2-27 (Ea)	Shock test: Level: 100 g Duration: 6 milliseconds Number of bumps: 3 shocks in each of 6 directions. Actuator is not connected.
Static load		Static push and pull tests of basic actuators with 500, 750 and 1,000 mm strokes.
Dynamic load		Dynamic push/pull tests of the actuator.
Self-locking test		Self-locking tests at dynamic and static load.
Abuse test		Tests at 100% duty cycle until damage.
Lifetime test		Lifetime tests performed at combined loads in push and pull situations.

Environmental tests - Electrical

Test	Specification	Comment
Power supply	ASAE EP455 (1990)	Operating voltages +10V - +16V Over voltage +26 (V) / 5 min. Reverse polarity –26(V) / 5min. Short circuit to ground 16 (V) / 5 min. Short circuit to supply 16 (V) / 5 min.
HF-immunity	EN61000-6-2	Level: 30 V/m. at 26 MHz – 1000 mHz 80% 1KHz
Emmision	EN61000-6-4	Level is inside limits for 12V motor
Insulation test		Level: 500VAC/25-100hz for 1 minute
Automotive transients	ISO 7637	Load dump test only accepted on motor power connection.
Current and Speed		Actuators with loads of 0N, 7,500N and 15,000N are tested at minus 30ºC, plus 20ºC and 70ºC

All electrical tests are conducted and radiated emission (EMC) tests.

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