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Actuator LA22

Data sheet

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LA22

LA22 is an in-line actuator specially designed with a small overall dimension for easy use in industrial, agricultural and rehabilitation products.

Thanks to its small outer dimensions and linear design, LA22 is well suited for applications where installation space is limited, such as on wheelchairs.

Features:
- 12/24 V DC permanent magnet motor
- Max. thrust 400 N (300 N in 12V)
- Stainless steel piston rod and piston rod eye made of reinforced plastic.
- Duty cycle: Max. 10% or 2 min. in use followed by 18 min. not in use.
- Ambient temperature +5° to +40° C
- Compact construction/design
- Protection class: IP51
- Colour: black
- 1.0 m straight cable without plug (no cable with IP51)
- Speed max. 37 mm/s
- Extremely quiet operation
- Max. stroke length 200 mm
- Storage temperature: - 40° to + 70° C

Options:
- Protection class: IP65 (only back fixture D and E)

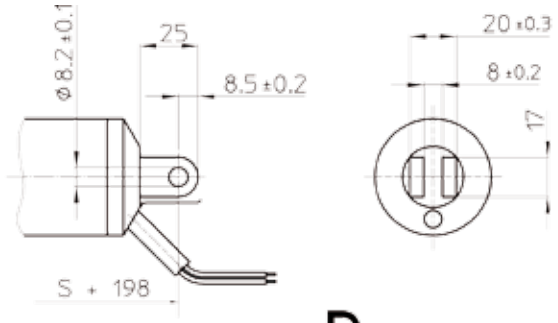
Usage:
- Should LA22 be used with a non LINAK control unit, please ask the nearest LINAK representative for further details.

Technical specifications:

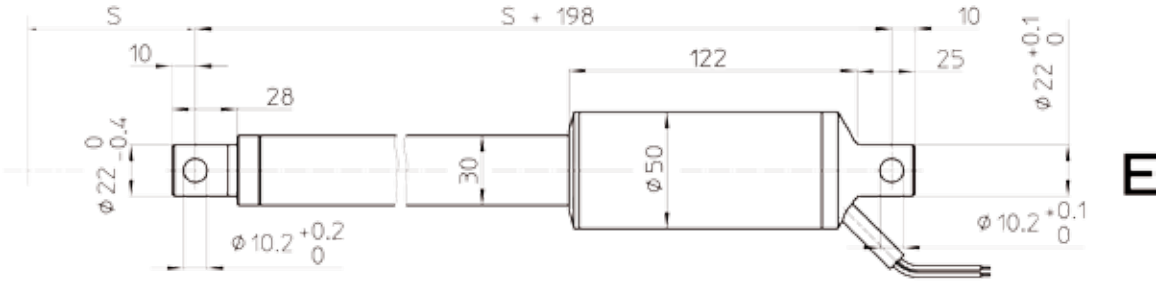
Type	Thrust max. Push (N)	Self-lock max. Push (N)	Thrust max. Pull (N)	Self-lock max. Pull (N)	Typical speed (mm/s) 0/full load*		Stroke length (mm)				Duty cycle (%)	Typical amp. at full load (A)	
												12V	24V
1 mm pitch	300	300	-	-	37	17.5	50	100	150	200	10	4.5	2.1
0,8 mm pitch	400	400	-	-	27	13.5	50	100	150	200	10	-	2.5
0,8 mm pitch	300	300	-	-	27	17	50	100	150	200	10	4.5	-

- LINAK control boxes are designed so that they will short-circuit the motor terminals (poles) of the actuator(s), when the actuator(s) are not running. This solution give the actuator(s) a higher self-locking ability. If the actuator(s) are not connected to a LINAK control box, the terminals of the motor must be short-circuited to give a higher selflocking ability.
- The above figures are with an ambient temperature of 20°C.
- There is no "pull" test data available at the present time, for more information please contact LINAK A/S.

Dimensions:



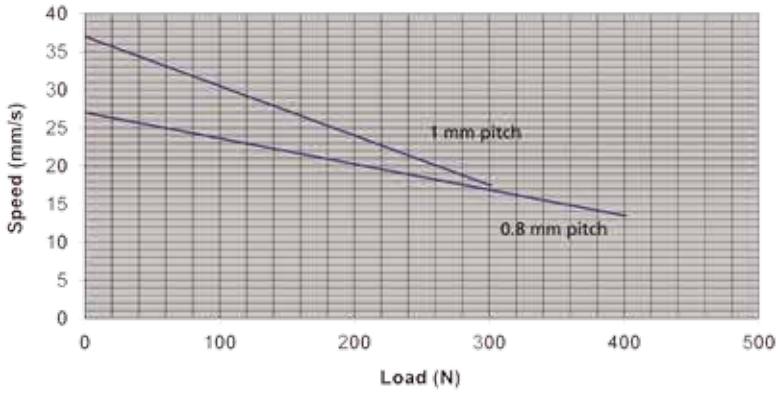
D



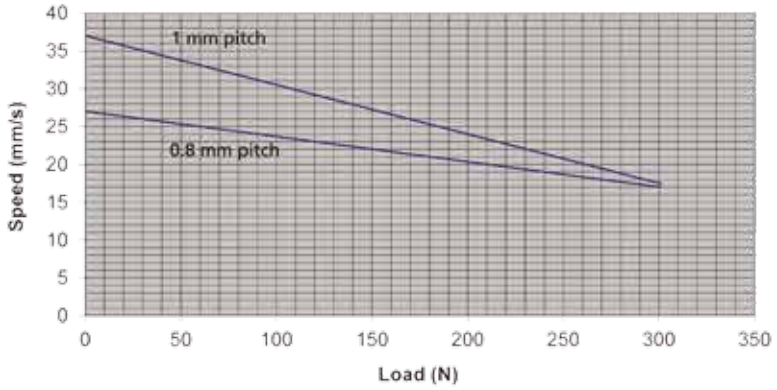
E

Graph:

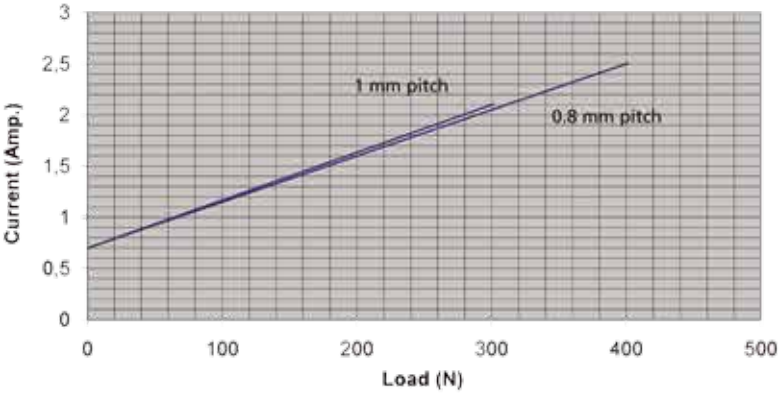
LA22 24V motor speed v´s load



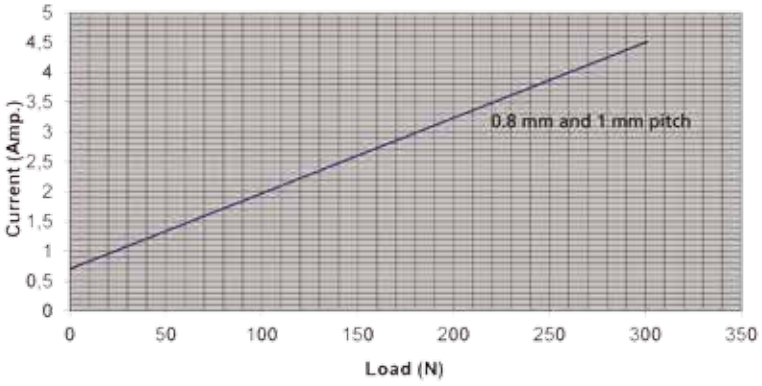
LA22 12V motor - Speed v's Load



LA22 24V motor Current v´s Load

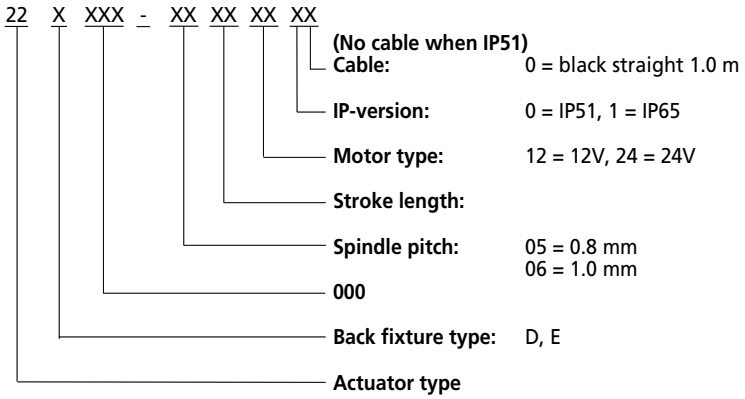


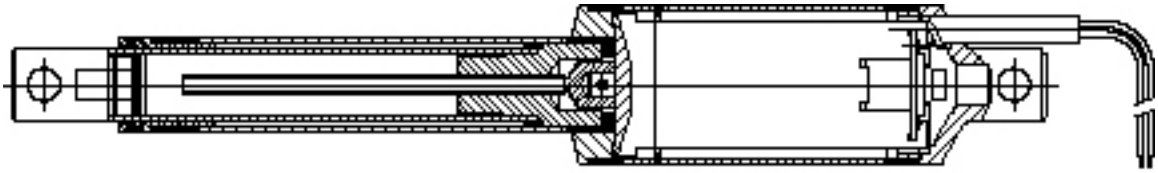
LA22 12V motor Current v´s Load



LA22

Ordering example:





Accessories

- CS16: electric limit switch, trips out the current to the actuator in the end position
- Possibility of connecting a handset to the CS16
- LS/LSD: limit switch, to be mounted on the actuator

Other information

- LA22 dB (A) 50; measuring method DS/EN ISO 3743-1, actuator not loaded

THE CURRENT SUPPLY TO LINEAR ACTUATORS MUST BE CUT OFF IN CASE OF OVERLOAD AND WHEN THE ACTUATORS REACH END POSITION.

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Actuator LA23
Data sheet

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LA23

The LA23 actuator is a small and strong push/pull actuator (up to 2500 N). The LA23 can be used in various applications where size is important.

Some of the benefits the LA23 offers you are:

- Compact design
- High lifting force
- Exchangeable cables

The standard LA23 is available for both the CARELINE® and MEDLINE® product ranges.

Features and options:

- Load in push: 2500N, 1800N, 1500N, 1200N, 900N or 300N
- Load in pull: 2500N, 1800N, 1500N, 1200N, 900N or 300N
- Housing colour: Grey or black
- Protection class: IPX4, IPX6
- Motor: 12 V DC, 24 V DC
- Stroke length: 20 - 300 mm
- Built-in dimensions: 110 - 146 mm + stroke length
- Positioning options: Potential free end stop signals
  Hall potentiometer or Hall PWM position
  Single Hall, Dual Hall
- Back fixture material: Plastic or steel
- Nut: Guided
- Safety nut: In push or pull
  (2500N and 1800N version only safety nut in push)
- Mechanical spline: Yes
- Built-in electrical end-stop: Yes
- Exchangeable cable: Yes
- Static safety factor: 2.5
- Noise level: Max. 58.5 dB(A) (At nominal voltage and with no load, according to EN ISO 3743-1)
- Mechanical end stop: Yes
- Integrated Control Yes

Usage:

- Duty cycle: 10%, 2 minutes continuous use followed by 18 minutes not in use
- Usage temperature: +5° - +40° normal operating temp.
  -30° - +50° according to test conditions: ISO 7176-9
- Storage temperature: -45°C to +70°C
  (according to ISO 7176-9)
- Compatibility: CB20, CB16, CB6S, CBJ 1/2, CBJC, CBJH, CBD4, CBD5 & CBD6*, CA30, CA40, CO61 and SMPS-T160 (for combination possibilities, please see the User Manual for SMPS-T160 on our website)
  * SLS must be ignored Up + Down in the CBD4, CBD5 or CBD6 when configured for LA23.
  * Only the 3, 6 & 12 mm versions can be configured in the CBD4, CBD5 or CBD6.
  * Only tested for single use.
- Approvals:
  IEC60601-1:2005 3rd ed.
  ANSI / AAMI ES60601-1:2005 3rd edition,
  LA23IC is not approved according to the above.
  LA23 in combination with CBD4, CBD5 & CBD6 has no approvals.
- Fire catagory: Enclosure UL94-V0

LA23
Ordering example:

23 6 1 A 0 1 0 00 250 A 4

IP degree:
4 = IPX4
6 = IPX6

Motortype:
A = 12V
B = 24V (Running mainly with battery (CBJ1, CBJ2, CBJH, CBJC, wheelchairs))
G = 24V (For OpenBus (CB20, CB16, CB6s)) not available with LA23IC

Stroke:
XXX = mm Min. 020 mm, Max. 300 mm in steps of 5 mm
Recommended versions:
020 mm , 050 mm , 100 mm, 150 mm, 200 mm, 250 mm, 300 mm

Positioning:
00 = No positioning
01 = Potential free end stop signals
02 = Dual Hall digital positioning
03 = Dual Hall PNP positioning

1x = Hall potentiometer feedback
2x = Hall potentiometer feedback and potential free endstop
3x = Hall PWM position feedback
4x = Hall PWM position and potential free endstop
50 = IC with standard electrical endstop - no positioning
52 = IC with Standard Single Hall Positioning
6x = IC with Hall potentiometer feedback.
7x = IC with Hall PWM position feedback
Xx for more information please call LINAK

Safety option:

0 = No safety options	(pitch 3, 5, 6, 9, 12 or 20)
1 = Safety nut for push	(pitch 3, 5, 6, 9 or 12)
2 = Safety nut for pull	(pitch 6, 9 or 12)
3 = Mechanical spline without safety nut	(pitch 3, 5, 6, 9 or 12)
4 = Mechanical spline with safety nut	(pitch 3, 5, 6, 9 or 12))

Housing colour:

1 = Black	(RAL 9005)
2 = Light grey	(RAL 7035)

Piston rod eye:
0 = Standard (steel) with slot (6.1 mm), eye Ø10.2 mm, incl. plastic bushings
1 = Standard (steel) with slot (6.1 mm), eye Ø10.2 mm (0231033)
2 = Standard (steel) with slot (6.1 mm), eye Ø12.3 mm (0231016)

Back fixture rotation:

0 = 0° clockwise	H = 60° clockwise	Q = 120° clockwise
A = 7.5° clockwise	J = 67.5° clockwise	R = 127.5° clockwise
B = 15° clockwise	K = 75° clockwise	S = 135° clockwise
C = 22.5° clockwise	L = 82.5° clockwise	T = 142.5° clockwise
D = 30° clockwise	1 = 90° clockwise	U = 150° clockwise
E = 37.5° clockwise	M = 97.5° clockwise	V = 157.5° clockwise
F = 45° clockwise	N = 105° clockwise	W = 165° clockwise
G = 52.5° clockwise	P = 112.5° clockwise	Z = 172.5° clockwise

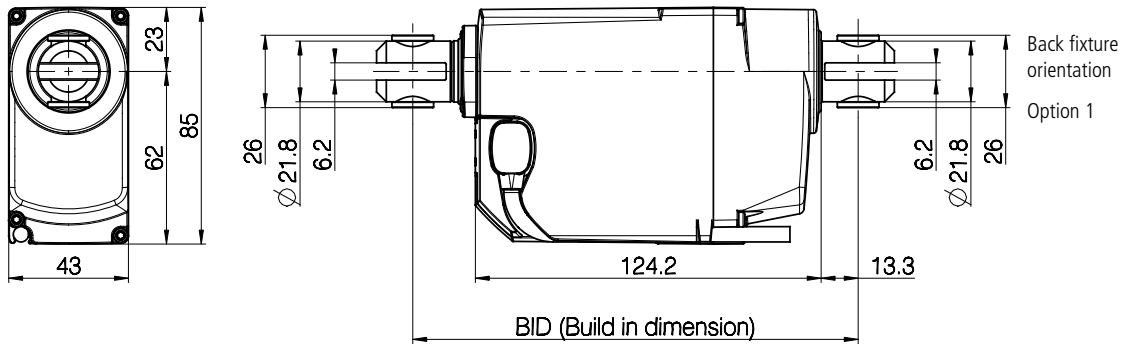
Back fixture:
1 = Plastic with slot (6.1 mm), eye Ø10.2 mm (only for Standard push load) (0231017)
(only for pitch 6, 9 or 12 and safety option 0 or 1 (push))
2 = Steel with slot (6.1 mm), eye Ø10.2 mm, incl. plastic bushings
3 = Steel with slot (6.1 mm), eye Ø10.2 mm (0231034)
4 = Steel with slot (6.1 mm), eye Ø12.3 mm (0231020)

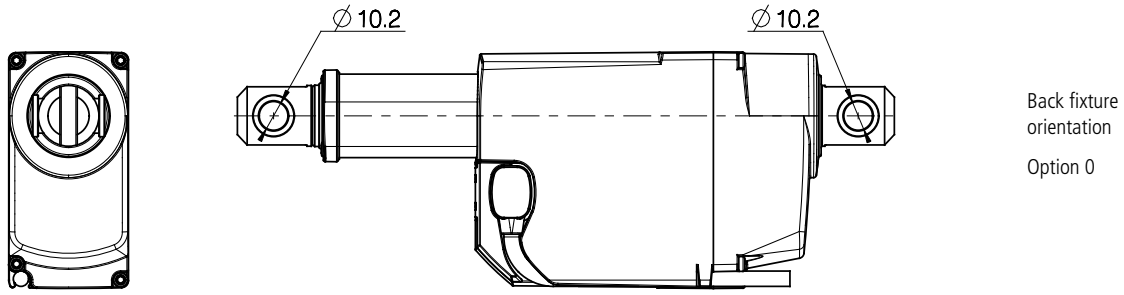
Spindletype:

2 = 20 mm pitch	(300 N)	(only in push and safety option 0)
3 = 3 mm pitch	(2500 N)	
5 = 5 mm pitch	(1800 N)	
6 = 6 mm pitch	(1500 N)	
9 = 9 mm pitch	(1200 N)	
0 = 12 mm pitch	(900 N)	

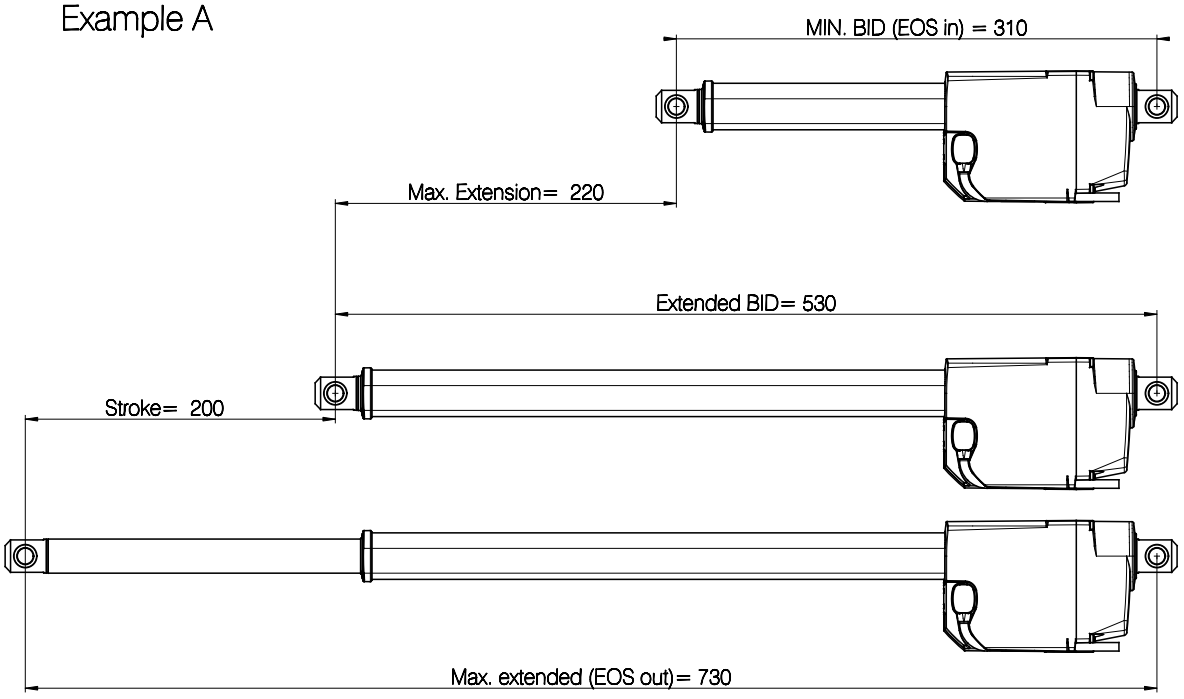
Actuator type:
23 = LA23

Dimensions:





Example A



Drawing number:0234024

The built-in dimension depends upon the chosen safety option and stroke length. Please see the table below to decide upon the built-in dimension.

Safety option	Stroke length	Spindle pitch	Min. built-in Dimensions
0 = No safety option	20 - 49	6, 9, 12 or 20	160
0 = No safety option	20 - 49	3, 5	168
1 = Safety nut for push	20 - 49	6, 9 or 12	160
1 = Safety nut for push	20 - 49	3, 5	168
2 = Safety nut for pull	20 - 49	6, 9 or 12	172
3 = Mechanical Spline for push	20 - 49	6, 9 or 12	180
3 = Mechanical Spline for push	20 - 49	3, 5	196
4 = Mechanical Spline & safety nut for push	20 - 49	6, 9 or 12	180
4 = Mechanical Spline & safety nut for push	20 - 49	3, 5	196
0 = No safety option	50 - 200	6, 9, 12 or 20	110 + stroke
0 = No safety option	50 - 200	3, 5	118 + stroke
1 = Safety nut for push	50 - 200	6, 9 or 12	110 + stroke
1 = Safety nut for push	50 - 200	3, 5	118 + stroke
2 = Safety nut for pull	50 - 200	6, 9 or 12	122 + stroke
3 = Mechanical Spline for push	50 - 200	6, 9 or 12	130 + stroke
3 = Mechanical Spline for push	50 - 200	3, 5	146 + stroke
4 = Mechanical Spline & safety nut for push	50 - 200	6, 9 or 12	130 + stroke
4 = Mechanical Spline & safety nut for push	50 - 200	3, 5	146 + stroke
0 = No safety option	201 - 300	6, 9, 12 or 20	130 + stroke
0 = No safety option	201 - 300	3, 5	138 + stroke
1 = Safety nut for push	201 - 300	6, 9 or 12	130 + stroke
1 = Safety nut for push	201 - 300	3, 5	138 + stroke
2 = Safety nut for pull	201 - 300	6, 9 or 12	142 + stroke
3 = Mechanical Spline for push	201 - 300	6, 9 or 12	150 + stroke
3 = Mechanical Spline for push	201 - 300	3, 5	166 + stroke
4 = Mechanical Spline & safety nut for push	201 - 300	6, 9 or 12	150 + stroke
4 = Mechanical Spline & safety nut for push	201 - 300	3, 5	166 + stroke

It is possible to order LA23 with extended built-in dimensions if the following requirements are fulfilled

<table>
<tr><td rowspan="3"></td><td>Spindle pitch = 6, 9, 12, 20</td><td>Spindle pitch = 3, 5</td><td>Spindle pitch = 6, 9, 12</td><td>Spindle pitch = 6, 9, 12</td><td>Spindle pitch = 3, 5</td></tr>
<tr><td colspan="2">Safety option 0 :
No safety option</td><td rowspan="2">Safety option 2 : safety nut pull</td><td colspan="2">Safety option 3 :
Spline without safety nut</td></tr>
<tr><td colspan="2">Safety option 1 :
safety nut push</td><td colspan="2">Safety option 4 :
Spline + safety nut push</td></tr>
<tr><td>Max. built-in dimensions</td><td>≤ 730 - stroke</td><td>≤ 738 - stroke</td><td>≤ 742 - stroke</td><td>≤ 750 - stroke</td><td>≤ 766 - stroke</td></tr>
</table>

Example:
A) 6 mm pitch no safety option, stroke 200, BID can be max. (730 - 200) = 530
B) 3 mm pitch no safety option, stroke 20, BID can be max. (738 - 20) = 718

Technical specifications:

Power supply	Spindle pitch (mm)	Load max. Push or Pull (N)	Motor type	*Typical speed at 0/ full load (mm/sec.)	*Typical current at 0/ full load (Amp.)	Inrush current (Amp)
12VDC	3	2500 / 2500	A: 12V	3.1 / 2.5	0.8 / 3.6	13.4
CBJ1/2, CBJH and CBJC	3	2500 / 2500	B: 24V	3.2 / 2.6	0.4 / 1.9	8.7
OpenBus™	3	2500 / 2500	G: 24V	3.3 / 2.7	0.3 / 1.4	6.2
12VDC	5	1800 / 1800	A: 12V	5.4 / 4.2	0.8 / 3.9	13.4
CBJ1/2, CBJH and CBJC	5	1800 / 1800	B: 24V	5.4 / 4.5	0.4 / 1.9	8.7
OpenBus™	5	1800 / 1800	G: 24V	5.6 / 4.6	0.3 / 1.4	6.2
12VDC	6	1500 / 1500	A: 12V	6.6 / 5.2	0.8 / 3.6	13.4
CBJ1/2, CBJH and CBJC	6	1500 / 1500	B: 24V	6.4 / 5.5	0.4 / 1.7	8.7
OpenBus™	6	1500 / 1500	G: 24V	6.7 / 5.5	0.3 / 1.3	6.2
12VDC	9	1200 / 1200	A: 12V	9.9 / 7.5	0.9 / 4.0	13.4
CBJ1/2, CBJH and CBJC	9	1200 / 1200	B: 24V	9.5 / 8.1	0.4 / 1.9	8.7
OpenBus™	9	1200 / 1200	G: 24V	9.9 / 8.1	0.3 / 1.3	6.2
12VDC	12	900 / 900	A: 12V	13 / 9.6	0.9 / 3.8	13.4
CBJ1/2, CBJH and CBJC	12	900 / 900	B: 24V	12.6 / 10.4	0.4 / 1.9	8.7
OpenBus™	12	900 / 900	G: 24V	13.3 / 10.7	0.3 / 1.4	6.2
12VDC	20	300 / 300	A: 12V	21.5 / 18.6	0.8 / 4.3	-
CBJ1/2, CBJH and CBJC	20	300 / 300	B: 24V	21.6 / 20.2	0.4 / 2.3	-
OpenBus™	20	300 / 300	G: 24V	21.8 / 20.6	0.3 / 1.6	-

* Typical values, measurements are made with an actuator in connection with a stable power supply.
The typical values can have a variation of ± 20% on the current values and ± 10% on the speed values.

Safety nut and steel back fixture overview

Pitch (mm)	Load (N)	Safety nut	Steel back fixture	Plastic back fixture
20	300	Not an option	Required in pull	Only in push
12	900	Optional in push or pull	Required in pull	Only in push
9	1200	Optional in push or pull	Required in pull	Only in push
6	1500	Optional in push or pull	Required in pull	Only in push
5	1800	Optional in push (Safety nut 2500N not available in pull)	Always required	Not available
3	2500	Optional in push (Safety nut 2500N not available in pull)	Always required	Not available

Self-locking specifications

Spindle pitch	Without short circuit	With short circuit
20 mm pitch	100	300
12 mm pitch	750	900
9 mm pitch	750	1200
6 mm pitch	1200	1500
5 mm pitch	1600	1800
3 mm pitch	2500	2500

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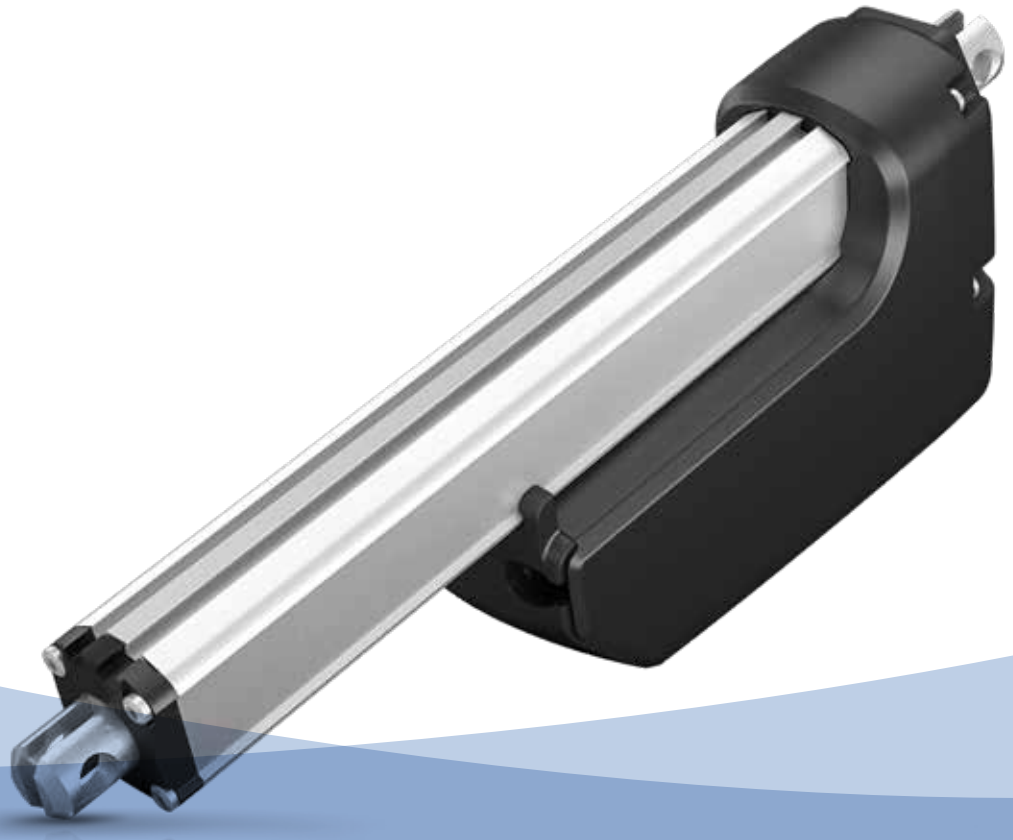

Actuator LA33
Data sheet

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LA33

The actuator LA33 is a true mid-size actuator that combines compact design and high power in one solution, fit for use in the most extreme environments. A thorough and demanding testing programme forms the basis for the maintenance-free and long lasting performance of this solid and high-quality actuator.

IC INTEGRATED CONTROLLER™

This **TECHLINE®** actuator comes with IC - Integrated controller.

For more information on our IC options, please see: https://www.linak.com/segments/techline/tech-trends/integrated-control/

Features:

- 12 or 24 V DC Permanent magnetic motor
- Thrust from 1,500 N - 5,000 N depending on gear ratio and spindle pitch
- Max. speed up to 35 mm/sec. depending on load and spindle pitch
- Stroke length from 100 to 600 mm
- Built-in endstop switches
- Non rotating piston rod eye
- Protection class: IP66 (dynamic) and IP69K (static)

Options in general:

- Exchangeable cables in different lengths
- Hall effect sensor
- IC options including:
  - IC - Integrated Controller
  - LIN bus communication
  - CAN bus communication
  - Analogue or digital feedback for precise positioning
  - Proportional control
  - Endstop signals
  - PC configuration tool

Usage:

- Duty cycle at 600 mm stroke is max. 20%
- Ambient operating temperature -40°C to +85°C, full performance from +5°C to +40°C

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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
Gear ratio:	2 different gear ratios available in steel
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:	- 40° C to +85° C - 40° F to +185° 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

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

LA33 with 12V motor

Type	Thrust max. Push/Pull (N)	Self-lock max. Push (N)	Self-lock max. Pull (N)	Spindle pitch (mm) / Gear	*Typical speed (mm/s)		Stroke length (mm) In steps of 50mm			*Typical amp. @ 12 V	
					No load	Full load	Min.		Max.	No load	Full load
33090xxxxxxxxA...	5000	5000	5000	9 / A	8.5	6	100	-	300**	2.8	10
33150xxxxxxxxA...	3500	3500	3500	15 / A	15	9	100	-	400**	2.8	10
33200xxxxxxxxA...	1500	1500	1500	20 / B	34	24	100	-	600	2.0	10

LA33 with 24V motor

Type	Thrust max. Push/Pull (N)	Self-lock max. Push (N)	Self-lock max. Pull (N)	Spindle pitch (mm) / Gear	*Typical speed (mm/s)		Stroke length (mm) In steps of 50mm			*Typical amp. @ 24 V	
					No load	Full load	Min.		Max.	No load	Full load
33090xxxxxxxxB...	5000	5000	5000	9 / A	9	7	100	-	300**	1.8	6.5
33150xxxxxxxxB...	3500	3500	3500	15 / A	15	13	100	-	400**	1.8	7.0
33200xxxxxxxxB...	1500	1500	1500	20 / B	35	30	100	-	600	1.8	6.5

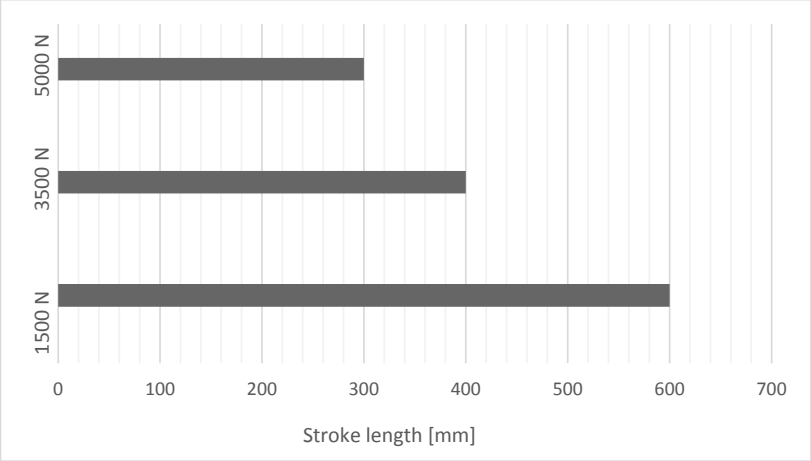
* The typical values can have a variation of ± 20% on the current values and ± 10% on the speed values.
Measurements are made with an actuator in connection with a stable power supply and an ambient temperature at 20°C.

** There are limitations on the stroke length if you need full load, please see "LA33 Load vs. stroke length"

- **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

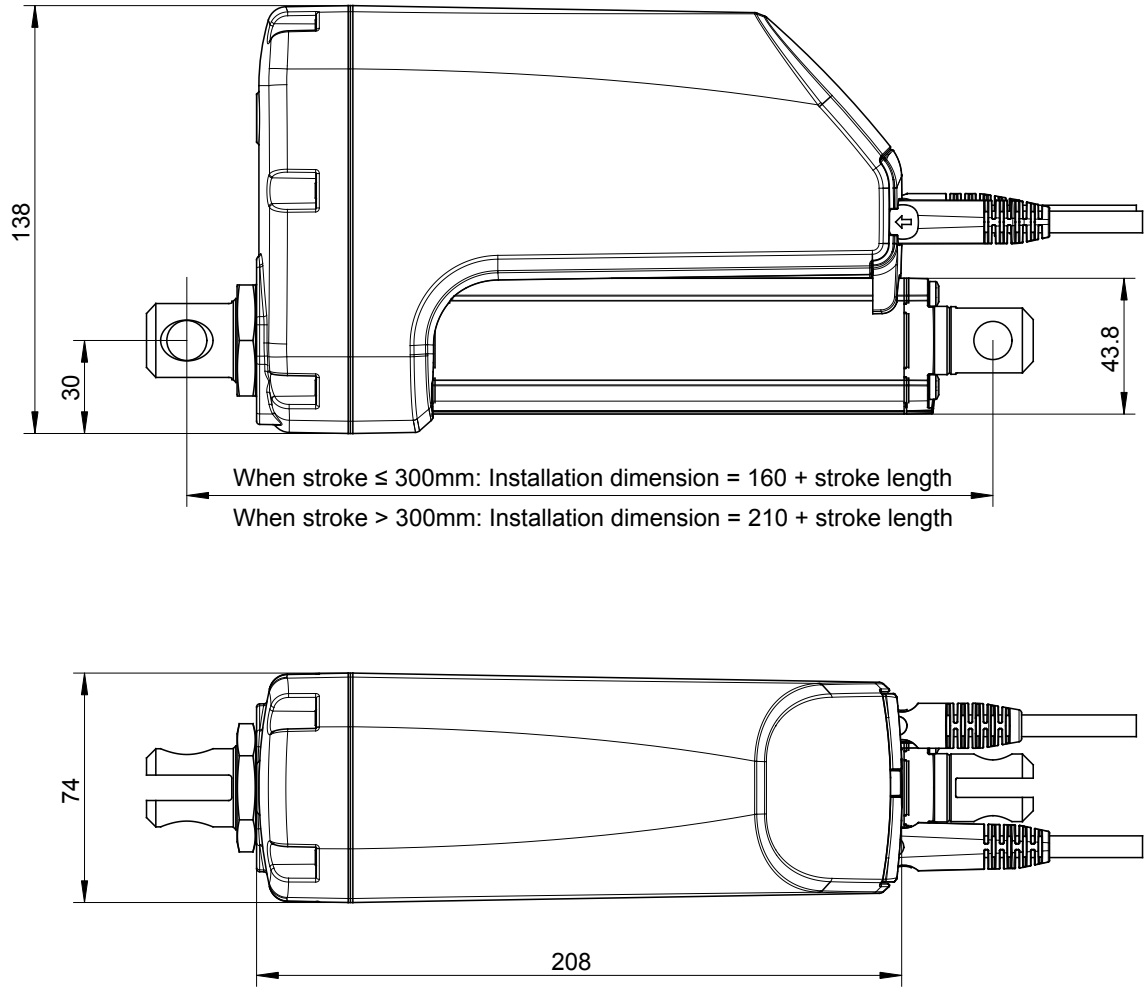


- For applications that only operate in pull the limitations are 600mm stroke and 5,000N load
- Safety factor 2

Stroke and built-in tolerances

End stop options	Descriptions	Stroke tolerance	Example for 200 mm stroke	BID tolerance	Example for 360 mm BID
All	With built-in limit switches or Integrated Controller	+/- 2 mm	198 to 202	+/- 4 mm	356 to 364

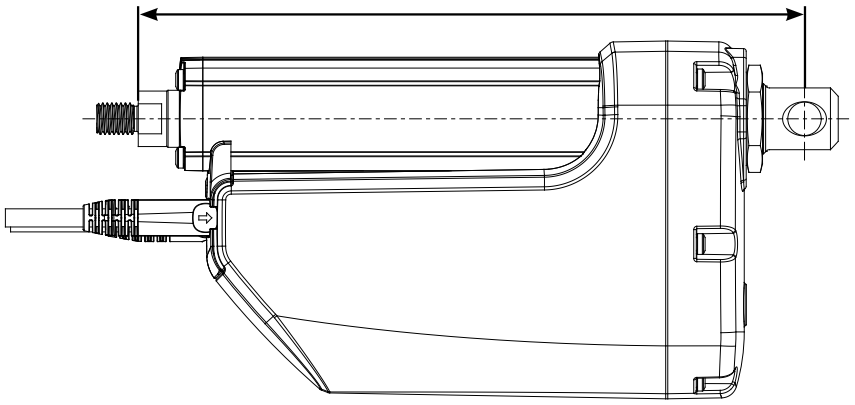
LA33 Dimensions



Built-in dimensions

Piston rod	"1 and A" / to the centre of the hole		"2 and B" / to the centre of the hole		"4" / from the surface		"5" / from the surface		"C and 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	Stroke <=300	Stroke > 300
"1" and "2" / to the centre of the hole	160	210	160	210	150*	200*	157*	207*	171	221
"3" and "4" / to the centre of the hole	160	210	160	210	150*	200*	157*	207*	171	221
"A" and "B" / to the centre of the hole	160	210	160	210	150*	200*	157*	207*	171	221
"C" and "D" / to the centre of the hole	160	210	160	210	150*	200*	157*	207*	171	221

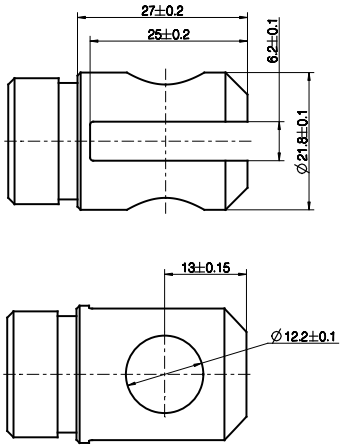
* These built-in dimensions are measured according to the illustration below.



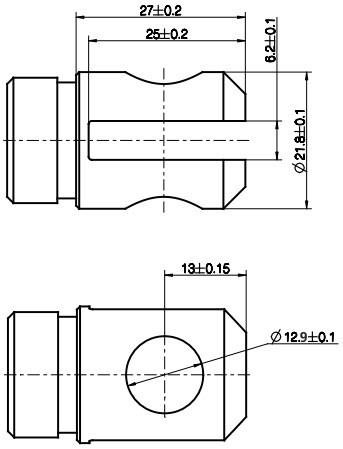
LA33 Piston Rod Eyes

When ordering AISI (304 and up) piston rod eye and back fixture, stainless steel screws are automatically included.

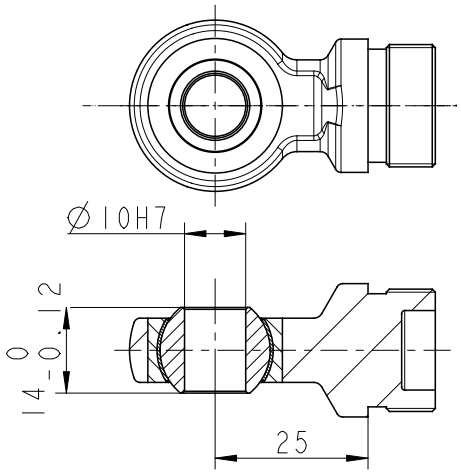
Option "1" and "A"
Piston 0331036, Zinc coated steel
Piston 0331140, Stainless steel AISI 304



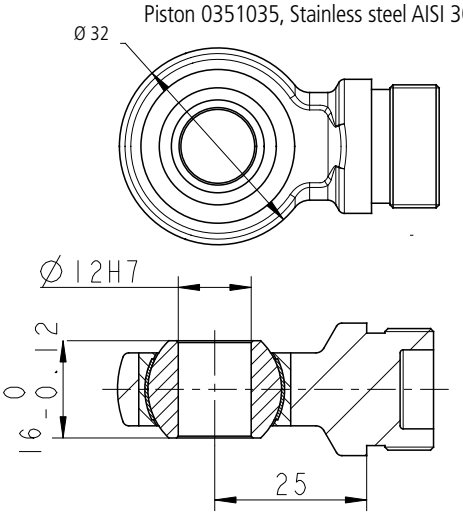
Option "2" and "B"
Piston 0331014, Zinc coated steel
Piston 0331139, Stainless steel AISI 304



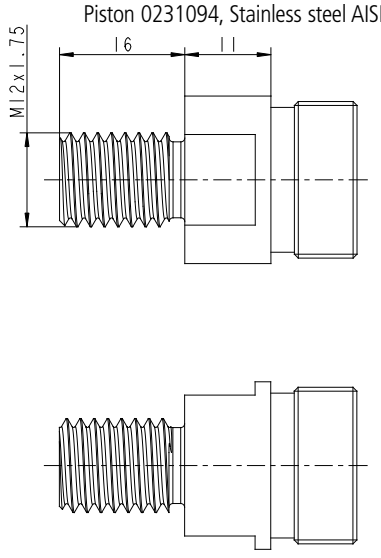
Option "C"
Piston 0351043, Stainless steel AISI 304



Option "D"
Piston 0351035, Stainless steel AISI 304



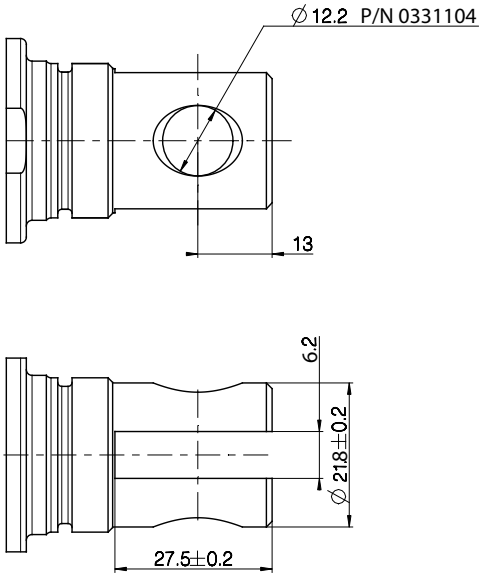
Option "5"
Piston 0231094, Stainless steel AISI 304



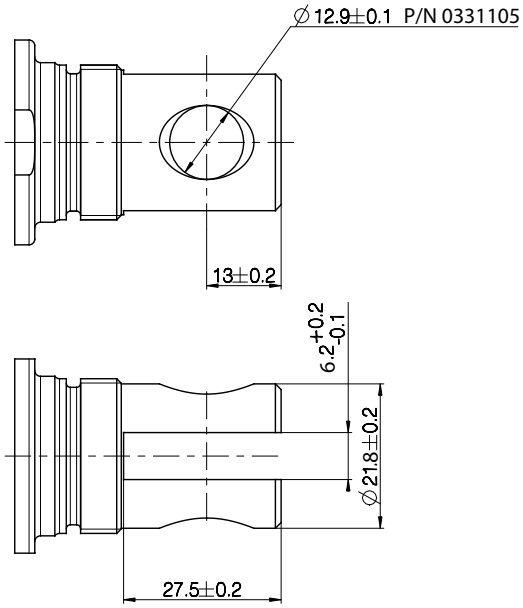
The Piston Rod Eye is only allowed to turn 0 - 90 degrees.

LA33 Back fixtures

Option "1" and "2"
LINAK P/N: 0331104, Zink coated steel
Option "A" and "B"
LINAK P/N: 0331108, Stainless steel AISI 304



Option "3" and "4"
LINAK P/N: 0331103, Zink coated steel
Option "C" and "D"
LINAK P/N: 0331105, Stainless steel AISI 304



Back fixture orientation

"0" Degrees

"90" Degrees

NB. All with tolerance of ±4°

Manual hand crank

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

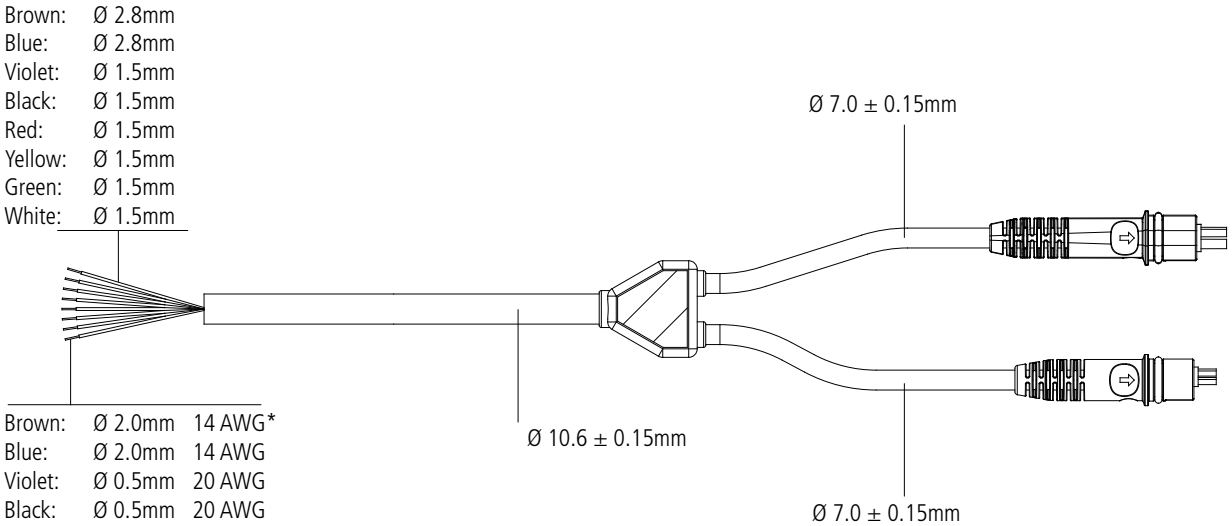
The cover over the Allen Key socket must be unscrewed before the Allen Key can be inserted and the Hand Crank operated.

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

- 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.
- IC actuators is supplied without manual hand crank.

Cable dimensions

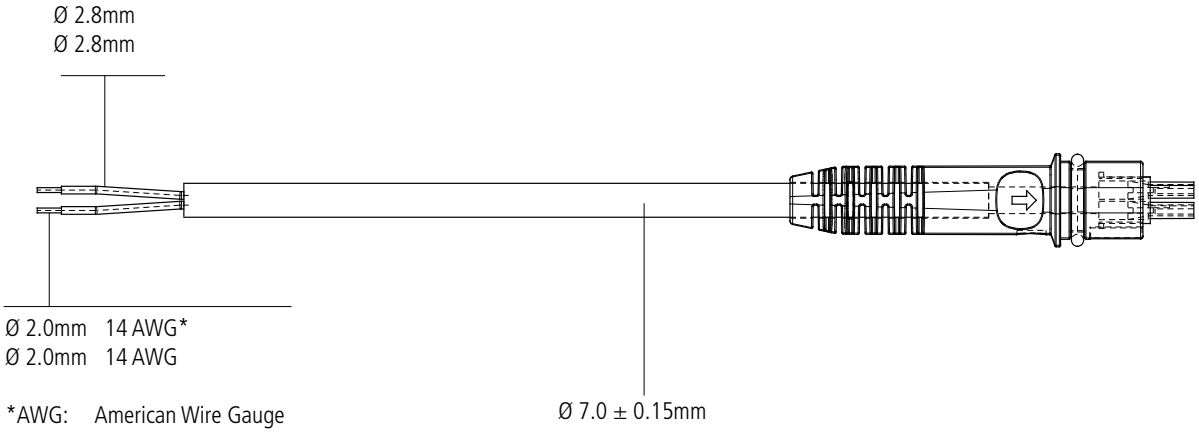
Y-cable dimensions:



*AWG: American Wire Gauge

Cable dimensions

Power cable dimensions:



*AWG: American Wire Gauge

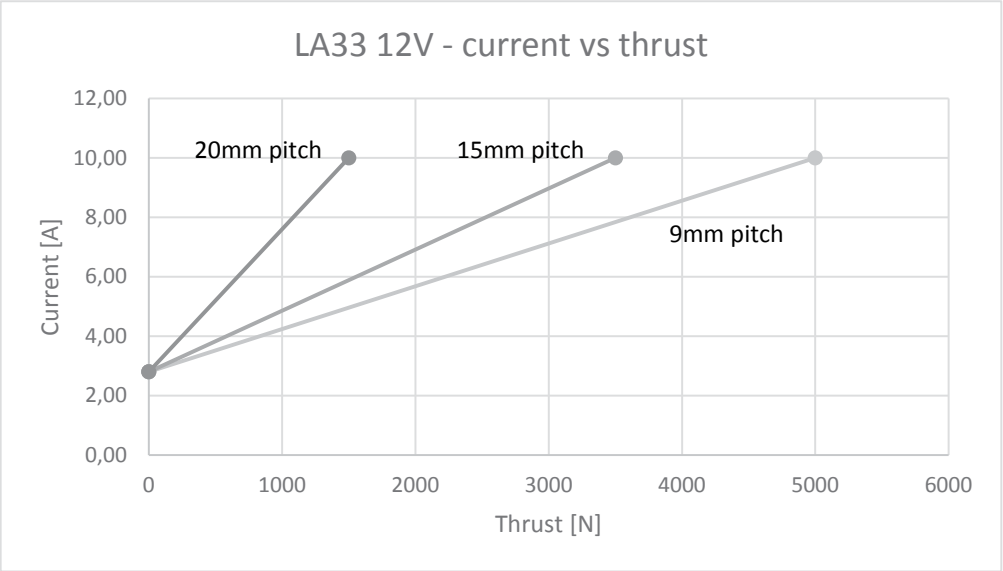
Signal cable dimensions:

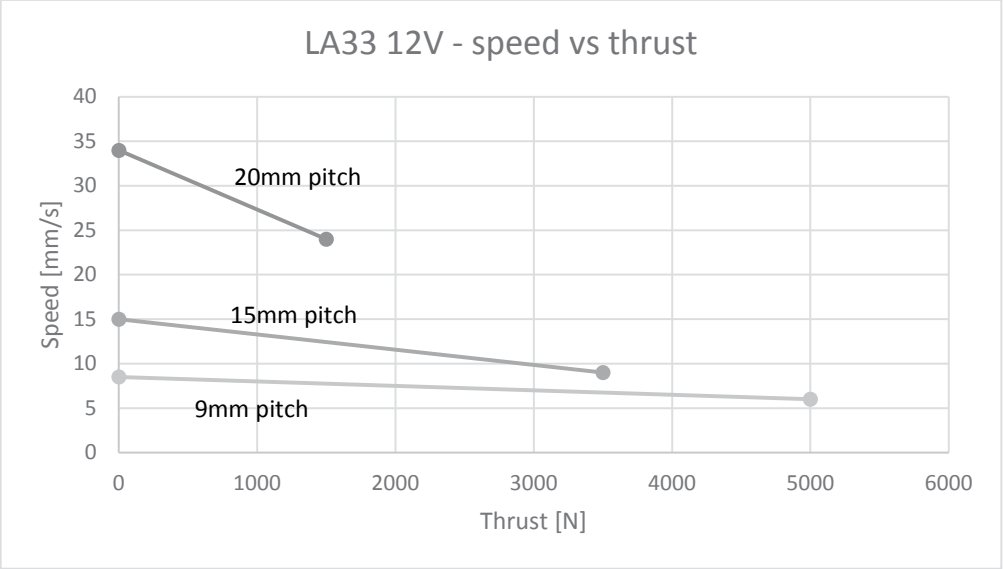
Violet: Ø 1.5mm
Black: Ø 1.5mm
Red: Ø 1.5mm
Yellow: Ø 1.5mm
Green: Ø 1.5mm
White: Ø 1.5mm

*AWG: American Wire Gauge

Speed and current curves - 12V motor

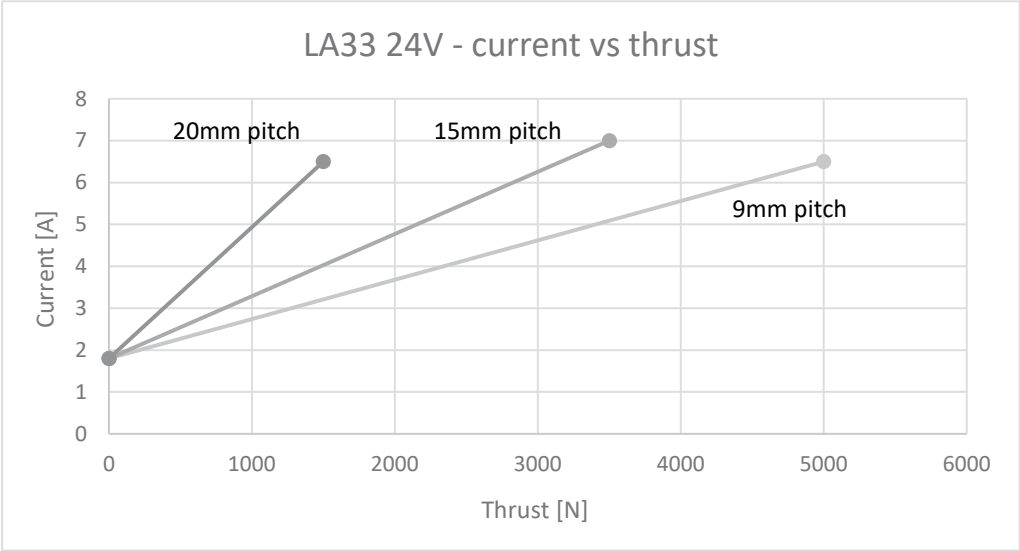
The values below are typical values and made with a stable power supply and an ambient temperature of 20˚C.

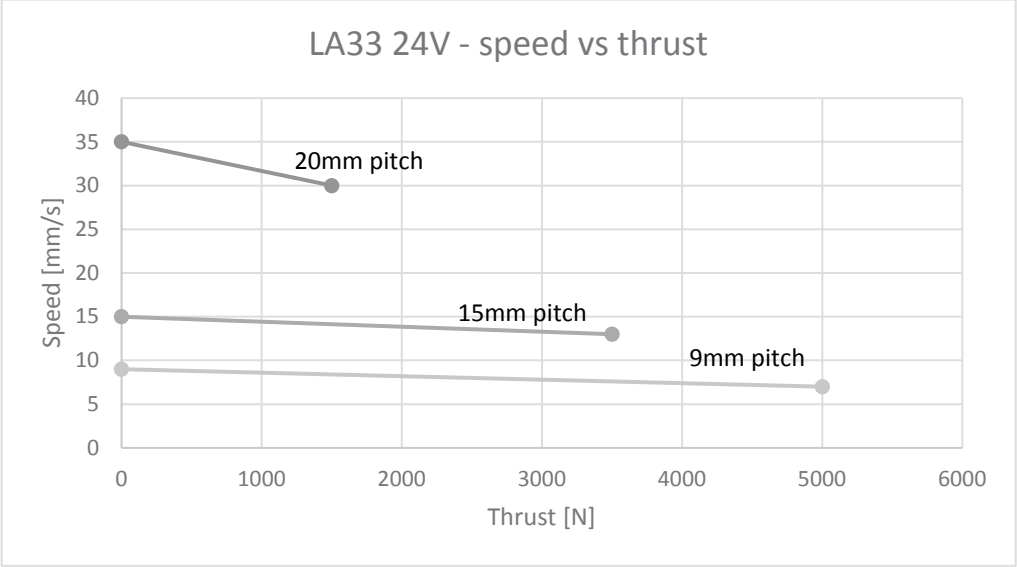




Speed and current curves - 24V motor

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





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. 12A depending on load 24V, max. 9A 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 24VDC (+/-) 12V ± 20% 24V ± 10% Under normal conditions: 12V, max. 12A depending on load 24V, max. 9A 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 ± 10%	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 - Single Hall

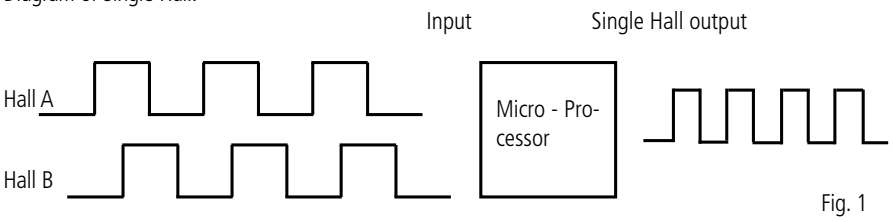
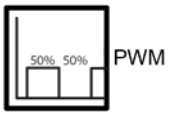
<table>
<tr><th>Input/Output</th><th>Specification</th><th>Comments</th></tr>
<tr><td>Description</td><td>The actuator can be equipped with Single Hall that gives a relative positioning feedback signal when the actuator moves.</td><td>
</td></tr>
<tr><td>Brown</td><td rowspan="2">12 or 24VDC (+/-)
12V ± 20%
24V ± 10%
Under normal conditions:
12V, max. 12A depending on load
24V, max. 9A 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 ± 10%</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:
33090: Actuator = 0.3 mm per count
33150: Actuator = 0.5 mm per count
33200: Actuator = 1.1 mm per count
Frequency:
Frequency is up to 125 Hz on Single Hall output depending on load and spindle.Overvoltage on 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 your local LINAK subsidiary.
Low frequency with a high load. Higher frequency with no load.</td></tr>
<tr><td colspan="2">Diagram of Single Hall:
 

Fig. 1</td></tr>
<tr><td>White</td><td colspan="2">Not to be connected</td></tr>
</table>

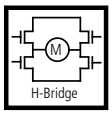
I/O specifications: Actuator with endstop signals and absolute positioning - Analogue feedback

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% Under normal conditions: 12V, max. 12A depending on load 24V, max. 9A 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 ± 10%	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 0.5-4.5V	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	

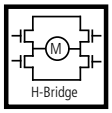
I/O specifications: Actuator with endstop signals and absolute positioning - PWM

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. 12A depending on load 24V, max. 9A 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 ± 10%	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% 20-80%	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 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 15A 24V, current limit 10A	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: 20A for 12V 15A for 24V
Blue	12-24VDC - (GND) Connect Blue to negative 12V ± 20% 24V ± 10%	
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
Yellow	Endstop signal in	
Violet	Not to be connected	
White	Not to be connected	

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 15A 24V, current limit 10A	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: 20A for 12V 15A for 24V
Blue	12-24VDC - (GND) Connect Blue to negative 12V ± 20% 24V ± 10%	
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 end stop, it is not necessary to choose the position feedback EOS and Virtual end stop will work even when feedback is not chosen
Yellow	Endstop signal in	

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

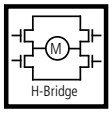
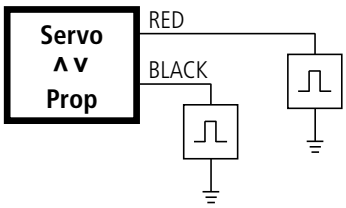
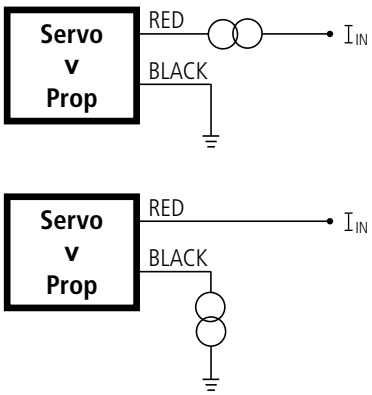
Input/Output	Specification	Comments
Violet	Analogue feedback (0-10V): Configure any high/low combination between 0-10V	Ripple max. 200mV Transaction delay 20ms Linear feedback 0.5% Max. current output. 1mA
	Single Hall output (PNP) Movement per Single Hall pulse: 33090: Actuator = 0.3 mm per count 33150: Actuator = 0.5 mm per count 33200: Actuator = 1.1 mm per count Frequency: Frequency is up to 125 Hz on Single Hall output depending on load and spindle. Overvoltage on the motor can result in shorter pulses	Output voltage min. V_{IN} - 2V Max. current output: 12mA Max. 680nF Open collector source current max. 12mA
	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, 85mA 24V, 50mA 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)

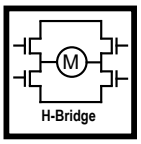
I/O specifications: Actuator with proportional control

Input/Output	Specification	Comments
Description	Easy to use interface with integrated power electronics (H-bridge). The actuator is speed controlled by means of a PWM or 4-20mA signal. Proportional provides a wide range of possibilities for customisation.	
Brown	12-24VDC + (VCC) Connect Brown to positive 12V ± 20% 24V ± 10% 12V, current limit 15A 24V, current limit 10A	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: 20A for 12V 15A for 24V
Blue	12-24VDC - (GND) Connect Blue to negative 12V ± 20% 24V ± 10%	
Red Black	PWM: 	Signal levels: > 10V = High < 2V = Low with reference to power GND (blue) Equivalent input resistance ≈ 22k Frequency: Min. 100Hz Max. 1000Hz Overcurrent protected, reverse voltage protected
	4-20mA: 	Sinking current with reference to power GND (blue) Common mode voltage: GND to V supply Equivalent input resistance ≈ 135ohm Overcurrent protected, reverse voltage protected
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 end stop, it is not necessary to choose the position feedback EOS and Virtual end stop will work even when feedback is not chosen
Yellow	Endstop signal in	

I/O specifications: Actuator with proportional control

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: 33090: Actuator = 0.3 mm per count 33150: Actuator = 0.5 mm per count 33200: Actuator = 1.1 mm per count Frequency: Frequency is up to 125 Hz on Single Hall output depending on load and spindle. Overvoltage on the motor can result in shorter pulses	Output voltage min. V_{IN} - 2V Max. current output: 12mA Max. 680nF
	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, 85mA 24V, 50mA It is recommendable to have the actuator to activate its limit switches on a regular basis, to ensure more precise positioning
White	Signal GND	

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. 16, page 66	
Brown	12-24VDC + (VCC) Connect Brown to positive 12V ± 20% 24V ± 10% 12V, current limit 30A 24V, current limit 20A	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 20A for 12V and 15A for 24V.
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	LA36 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 LA25 CAN do not comply with this.

IC options overview

	Basic	Advanced	Proportional	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 Advanced and Proportional

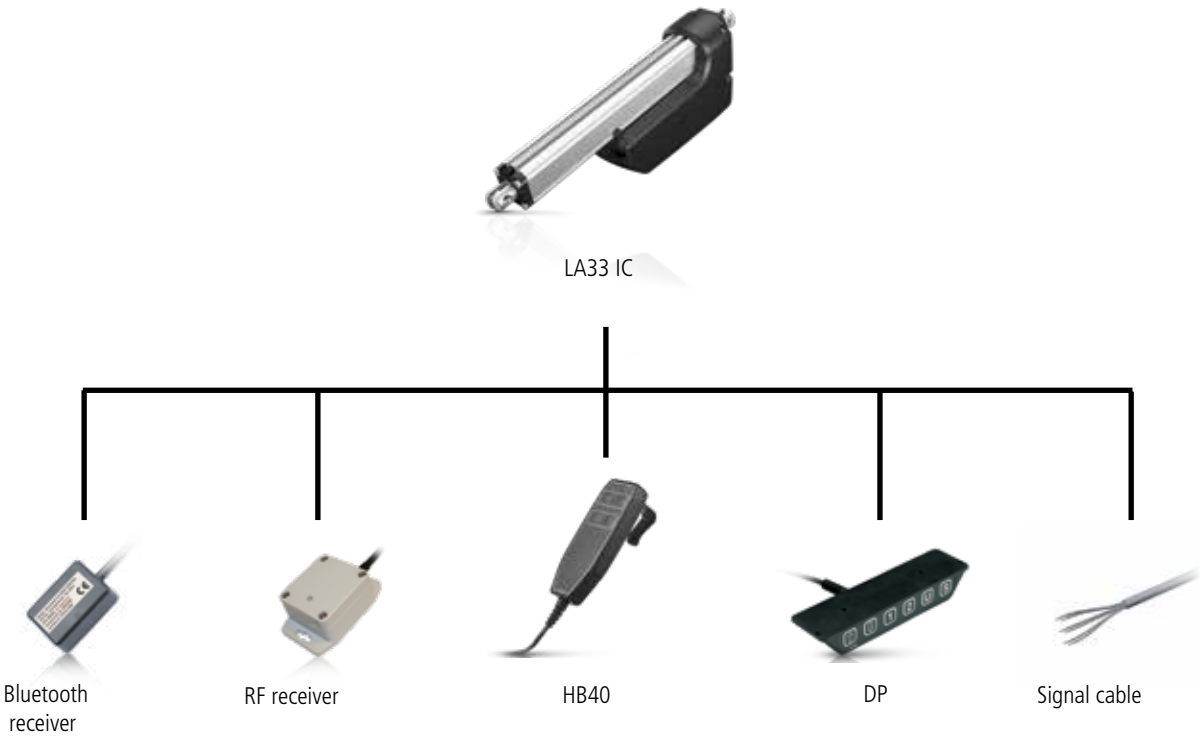
	Pre-configured	Customised range	Pros	Cons
None			N/A	N/A
PWM Feedback	10 – 90 % 75 Hz	0 – 100 % 75 – 150 Hz	Suitable for long distance transmission. Effectual immunity to electrical noise.	More complex processing required, compared to AFV and AFC.
Single Hall	N/A	N/A	Suitable for long distance transmission.	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.	Higher power consumption compared to AVF. 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 and Proportional

Actuator configurations available for IC Advanced and Proportional

	Pre-configured	**Customised range**	**Description**
Current limit inwards*	10A for both current limit directions. (When the current outputs are at zero, it means that they are at maximum value 10A). 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 7A, it will not be possible to change the current limits through BusLink to go higher than 7A. If the temperature drops below 0°C, all current limits will automatically increase to 15A for 24V, and 20A for 12V, independent of the pre-configured value.	Recommended range: 3A to 10A If the temperature drops below 0°C, all current limits will automatically increase to 15A for 24V, and 20A for 12V, 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. The positioning needs to be initialised from time to time, by reaching one of the physical endstops of the actuator, which 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 LA33 IC Advanced



Chapter 3

Environmental tests - Climatic

Test	Specification	Comment
Cold test	EN60068-2-1 (Ab)	Storage at low temperature: Temperature: - 40°C Duration: 72 h Actuator is not connected/operated Tested at room temperature
		Storage at low temperature: Temperature: -55°C Duration: 24 h Actuator is not connected Tested at room temperature
	EN60068-2-1 (Ad)	Operating at low temperature: Temperature: -40°C Duration: 4 h Tested at room temperature within 5 minutes overload
Dry heat	EN60068-2-2 (Bb)	Storage at high temperature: Temperature: +85°C Duration: 72 h Actuator is not connected/operated Tested at room temperature
	EN60068-2-2 (Bb)	Storage at low temperature: Temperature: +105°C Duration: 24 h Actuator operated at high temperature
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: 21 cycles * 24 hours Actuator is operated during test
Salt mist.	EN ISO 9227	Dynamic salt spray test: Salt solution: 5% sodium chloride (NaCl) Temperature: 35 ± 2°C Duration: 500 h Actuator is operated
Thermal shock		Dunk test: Actuator is heated to +85°C for 4 h and submerged into a 0°C cold salt-water-detergent solution for 2 h Followed by 18 h dry time Duration: 5 cycles

Environmental tests - Climatic

Degrees of protection	EN60529 - IP66	IP6X - Dust: Dust-tight, No ingress of dust Actuator is not activated
	EN60529 - IP66	IPX6 - Water: Ingress of water in quantities causing harmful effects is not allowed Duration: 100 litres pr. minute in 3 minutes Actuator is not activated
	DIN40050 - IP69K	IPX9K: High pressure cleaner Temperature: +80°C Water pressure: 80 - 100 bar Water flow: 14 - 16 l/min Duration: 30 sec. each at 4 different angles 0°, 30°, 60° and 90° Actuator is not activated Ingress of water in quantities causing harmful effects is not allowed

Environmental tests - Mechanical

Test	**Specification**	**Comment**
Mechanical Shock (Handling) - Drop test		3 drops on 6 faces onto a concrete floor. Drop height: 500 mm on all faces
Vibration Random	The specification is based on ISO 16750-3:2012(E) Test VII and should therefore be performed according to IEC 60068-2-64, random vibration. The PSD level is increased in the frequency range from 10 to 400[Hz]	Random vibration: From 10Hz to 2000 Hz Duration: 32 h/axis Acceleration: 6.9 [g_{ms}]

Environmental tests - Electrical

Standard	Specification	FOCUS ON
EN/IEC 60204-1:2006 + A1:2009 + AC:2010	Safety of machinery - Electrical equipment of machines - Part 1: General requirements	• INDUSTRIAL AUTOMATION
EN/IEC 61000-6-1: 2007	Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity for residential, commercial and light industrial environments	• INDUSTRIAL AUTOMATION
EN/IEC 61000-6-2: 2005 + AC:2005	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments	• INDUSTRIAL AUTOMATION
EN/IEC 61000-6-3: 2007 + A1:2011 + AC:2012	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments	• INDUSTRIAL AUTOMATION
EN/IEC 61000-6-4: 2007 + A1:2011	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards: Emission standard for industrial environments	• INDUSTRIAL AUTOMATION
ISO 16750-2:2012	Environmental conditions and testing for electrical and electronic equipment - Part 2: Electrical loads	• ROAD VEHICLES
ISO 7637-2:2011	Electrical disturbances from conduction and coupling - Part 2: Electrical transient conduction along supply lines only	• ROAD VEHICLES
ISO 7637-3:2007	Electrical disturbances from conduction and coupling - Part 3: Electrical transient transmission by capacitive and inductive coupling via lines other than supply lines	• ROAD VEHICLES
CISPR 25 IEC:2008	Radio disturbance characteristics – Limits and methods of measurement for the protection of on-board receivers	• VEHICLE, BOATS AND INTERNAL COMBUSTION ENGINES
ISO 11452-1, 2, 4		

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

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