

ACTUATOR LA36

Features:

- 12, 24 or 36 V DC Permanent magnetic motor (IC only 12/24 V DC, IECEEx/ATEX only 24 V DC)
- Thrust from 500 N - 10,000 N depending on gear ratio and spindle pitch
- Max. speed up to 160 mm/sec. depending on load and spindle pitch
- Stroke length from 100 to 999 mm
- Non rotating piston rod eye
- Protection class: IP66 (dynamic) and IP69K (static)

Options in general:

- Mechanical overload protection through integrated slip clutch
- Exchangeable cables in different lengths
- Special anodised housing for extreme environments
- IECEEx/ATEX certified for Zone 21
- Built-in endstop switches
- Hall effect sensor
- Mechanical potentiometer (not with IC)
- IC options including:
 - IC - Integrated Controller
 - Integrated Parallel Controller
 - Modbus and LINbus communication
 - Analogue or digital feedback for precise positioning
 - Endstop signals
 - PC configuration tool

Usage:

- Duty cycle at max. load from 5 -20% depending on load and stroke length. Ambient operating temperature -30°C to +65°C, full performance from +5°C to +40°C



The actuator LA36 is one of the most solid and powerful LINAK actuators, designed to operate under extreme conditions. The LA36 is a maintenance-free product with a long lifetime and a high IP degree. This high-quality actuator offers a very strong alternative to hydraulic solutions.



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



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Chapter 1

Specifications

Motor:	Permanent magnet motor 12, 24, or 36V *
Cable:	Motor: 2 x 14 AWG PVC cable Control: 6 x 20 AWG PVC cable **
Gear ratio:	6 different gear ratios available in steel (500 N, 1,700/2,600 N, 4,500 N, and 6,800/10,000 N)
Slip clutch:	Mechanical overload protection through an integrated slip clutch
Brake:	Integrated brake ensures a high self-locking ability. The brake is deactivated when the actuator is powered 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
Piston rod eye and back fixture:	When ordering AISI (304 and up) piston rod eye and back fixture, stainless steel screws are automatically included
Temperature range:	- 30° C to +65° C - 22° F to +149° 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 cables 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

LA36 with 12V motor

Order number	Push max. (N)	Pull max. (N)	*Self-lock min. (N) Push	*Self-lock min. (N) Pull	Pitch (mm/spindle rev.)	*Typical speed (mm/s) Load		Standard stroke lengths (mm) In steps of 50 mm	*Typical amp. (A) 12 V	
						No	Full		No load	Full load
36080xxxxxAxxxxHxxxxxxxxxxx	10000	10000	13000	13000	8	11	7	100 - 999**	4.5	22
36120xxxxxAxxxxFxxxxxxxxxxx	2600	2600	3400	3400	12	40.7	30.6	100 - 999	4.5	21
36120xxxxxAxxxxGxxxxxxxxxxx	4500	4500	5800	5800	12	23.1	17.8	100 - 999**	4.5	20.7
36120xxxxxAxxxxHxxxxxxxxxxx	6800	6800	8800	8800	12	15.5	11.9	100 - 999**	4.5	21
36200xxxxxAxxxxFxxxxxxxxxxx	1700	1700	2200	2200	20	68	52	100 - 999	4.5	22
36200xxxxxAxxxxExxxxxxxxxxx	500***	500***	1000	1000	20	160	135	100 - 999	4.5	20

LA36 with 24V motor

Order number	Push max. (N)	Pull max. (N)	*Self-lock min. (N) Push	*Self-lock min. (N) Pull	Pitch (mm/spindle rev.)	*Typical speed (mm/s) Load		Standard stroke lengths (mm) In steps of 50 mm	*Typical amp. (A) 24 V	
						No	Full		No load	Full load
36080xxxxxBxxxxHxxxxxxxxxxx	10000	10000	13000	13000	8	11	7	100 - 999**	2.4	10.4
36120xxxxxBxxxxFxxxxxxxxxxx	2600	2600	3400	3400	12	41	32.3	100 - 999	2.4	10.4
36120xxxxxBxxxxGxxxxxxxxxxx	4500	4500	5800	5800	12	23.3	18.9	100 - 999**	2.4	10.2
36120xxxxxBxxxxHxxxxxxxxxxx	6800	6800	8800	8800	12	15.7	12.7	100 - 999**	2.4	10.3
36200xxxxxBxxxxFxxxxxxxxxxx	1700	1700	2200	2200	20	68	52	100 - 999	2.4	10.3
36200xxxxxBxxxxExxxxxxxxxxx	500***	500***	1000	1000	20	160	135	100 - 999	2.4	10.0

LA36 with 36V motor

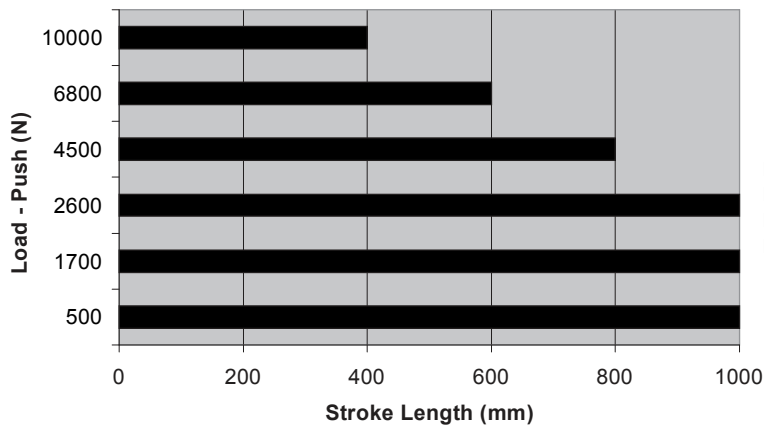
Order number	Push max. (N)	Pull max. (N)	*Self-lock min. (N) Push	*Self-lock min. (N) Pull	Pitch (mm/spindle rev.)	*Typical speed (mm/s) Load		Standard stroke lengths (mm) In steps of 50 mm	*Typical amp. (A) 36 V	
						No	Full		No load	Full load
36080xxxxxCxxxxHxxxxxxxxxxx	10000	10000	13000	13000	8	11	7	100 - 999**	2.0	8.0
36120xxxxxCxxxxFxxxxxxxxxxx	2600	2600	3400	3400	12	41	33.5	100 - 999	2.0	8.0
36120xxxxxCxxxxGxxxxxxxxxxx	4500	4500	5800	5800	12	23.3	19.1	100 - 999**	2.0	8.0
36120xxxxxCxxxxHxxxxxxxxxxx	6800	6800	8800	8800	12	15.7	12.8	100 - 999**	2.0	8.0
36200xxxxxCxxxxFxxxxxxxxxxx	1700	1700	2200	2200	20	68	52	100 - 999	2.0	8.0
36200xxxxxCxxxxExxxxxxxxxxx	500***	500***	1000	1000	20	160	135	100 - 999	2.0	8.0

- * The typical values can have a variation of $\pm 20\%$ on the current values and $\pm 10\%$ 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 " LA36 Load v. Stroke Length"
- *** Note: Fully loaded actuators need a softstart in order to prevent the clutch from slipping when starting (see curves).



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

LA36 Load versus Stroke Length



N.B.
LA36 500 - 1.700 N is with 20 mm spindle pitch
LA36 500 - 6.800 N is with 12 mm spindle pitch
LA36 500 - 10.000 N is with 8 mm spindle pitch

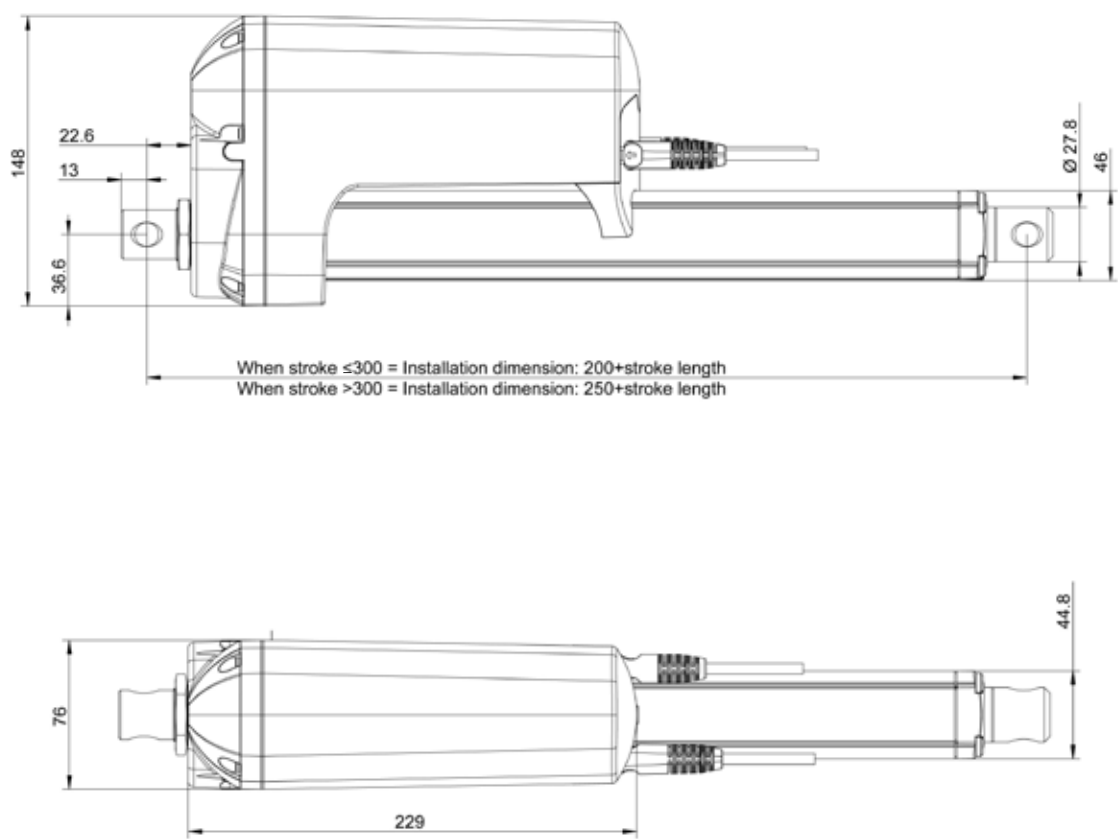


- For applications that only operate in pull the limitations are 999 mm stroke and 10,000 N load.
- Safety factor 2.

Stroke and built-in tolerances

End stop options E.g. 36XXXX+?XXXXXXXX	Descriptions	Stroke tolerance	Example for 200mm stroke	BID tolerance	Example for 200mm BID
? = 0	Without endstop switches Mechanical endstop	+/- 2mm	198 to 202mm	+/- 2mm	198 to 202mm
? = 1 to 4	With built-in limit switches	+0/-4mm	196 to 200mm	+/- 4mm	196 to 204mm
? = 7, 8, 9, A, B	Integrated controller Modbus Linbus	+0/-6mm	194 to 200mm	+/- 4mm	196 to 204mm

LA36 Dimensions

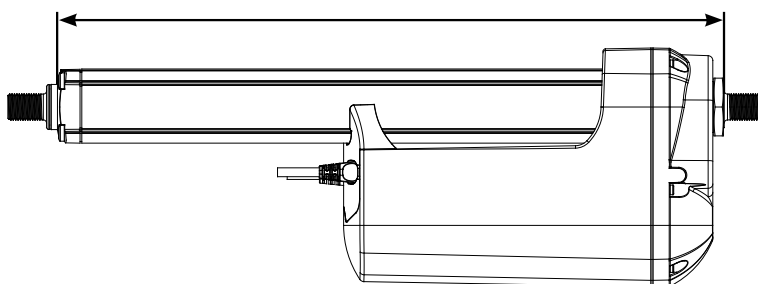


Built-in dimensions

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

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

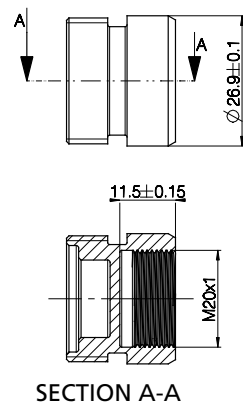
* These built-in dimensions are measured according to the illustration below.



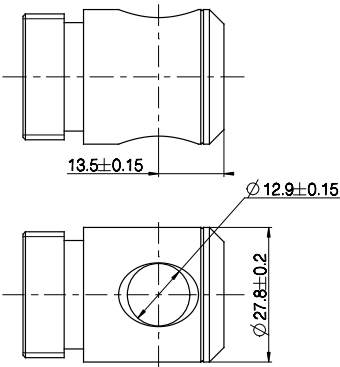
LA36 Piston Rod Eyes

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

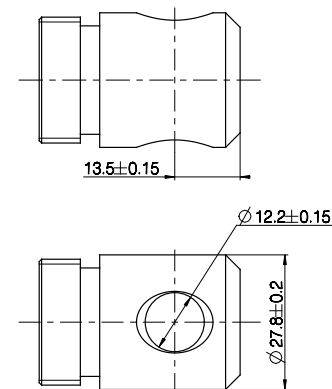
Option "0"
AISI 303



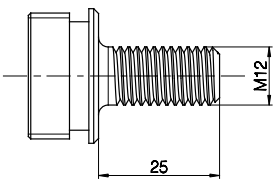
Option "1"
Free cutting steel galvanised surface



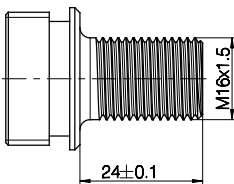
Option "2"
Free cutting steel galvanised surface



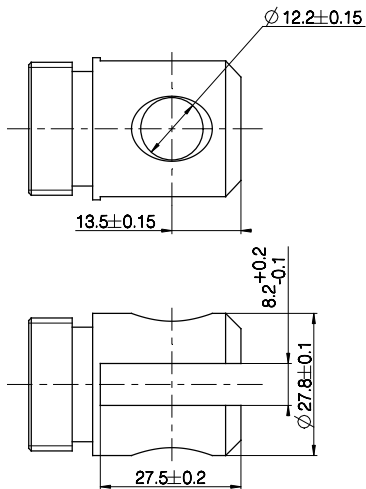
Option "3"
AISI 303



Option "4"
AISI 303

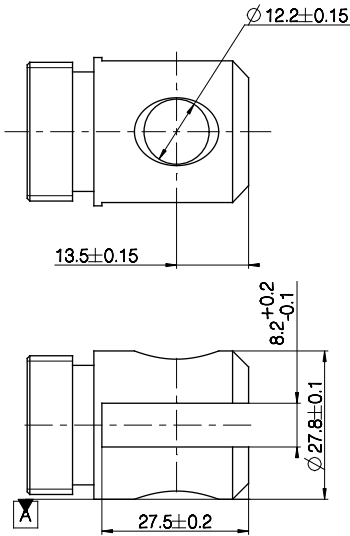


Option "5"
Free cutting steel galvanised surface

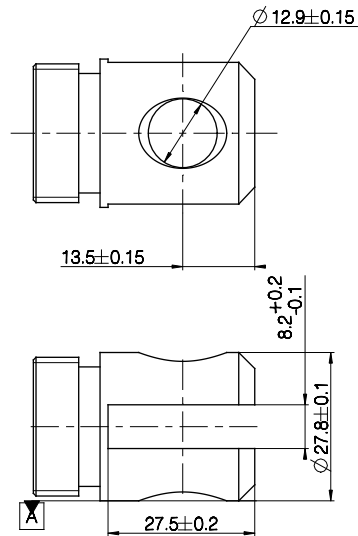


LA36 Piston Rod Eyes

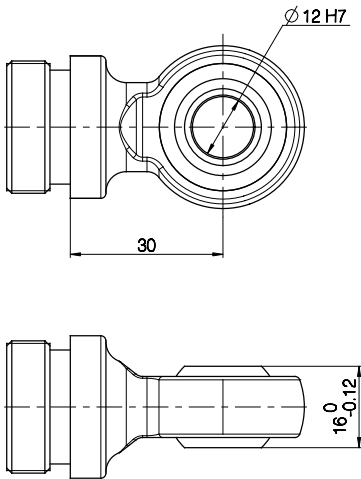
Option "A"
AISI 304



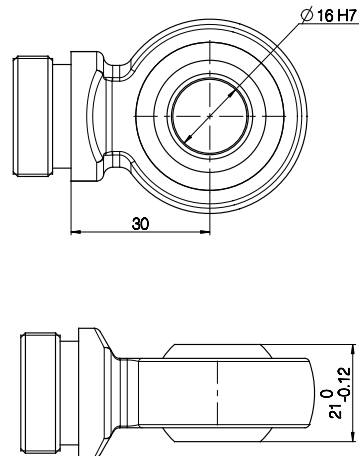
Option "B"
AISI 304



Option "C"
10KN = Max. load 6800 N in pull
AISI 304



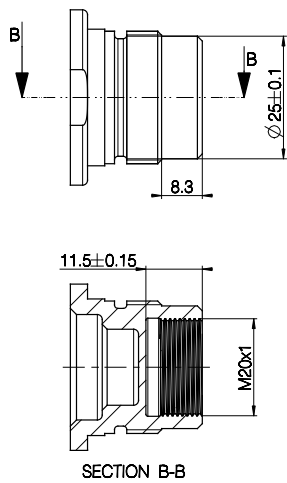
Option "D"
AISI 304



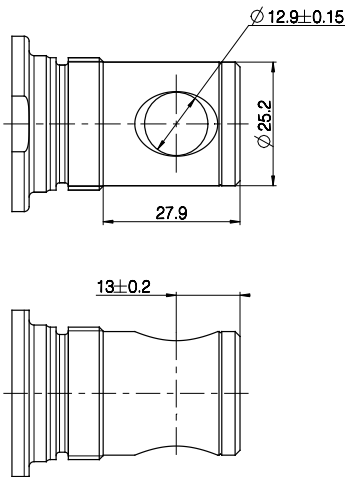
The Piston Rod Eye is only allowed to turn 0 - 90 degrees.

LA36 Back fixtures

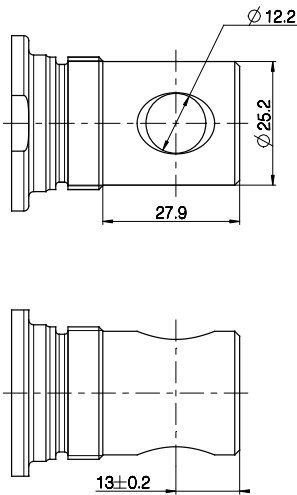
Option "0"
AISI 303



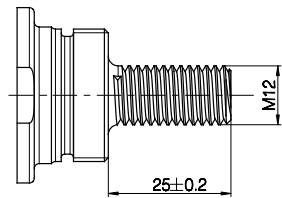
Option "1" and "2"
Free cutting steel galvanised surface



Option "3" and "4"
Free cutting steel galvanised surface

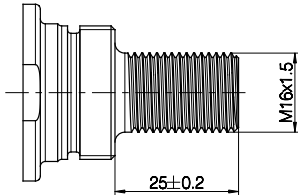


Option "5"
AISI 303

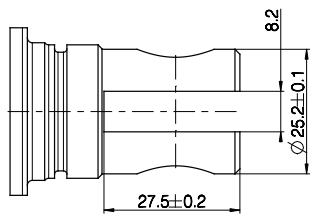
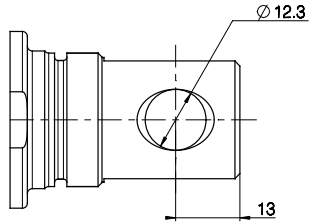


LA36 Back fixtures

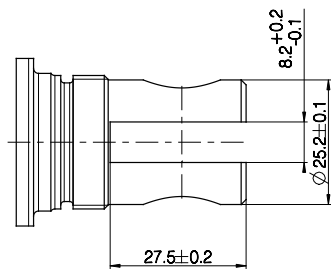
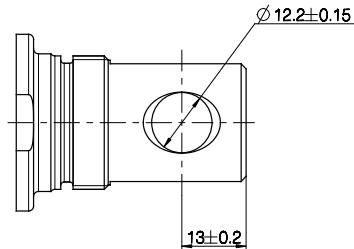
Option "6"
AISI 303



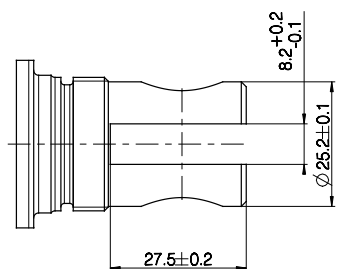
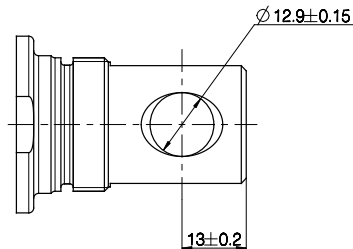
Option "7" and "8"
Free cutting steel galvanised surface



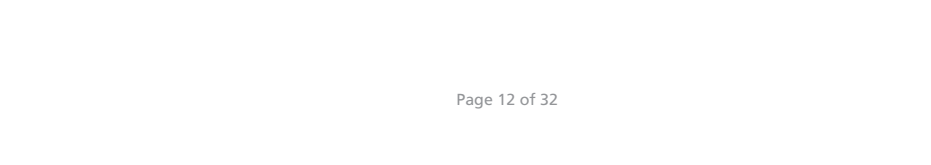
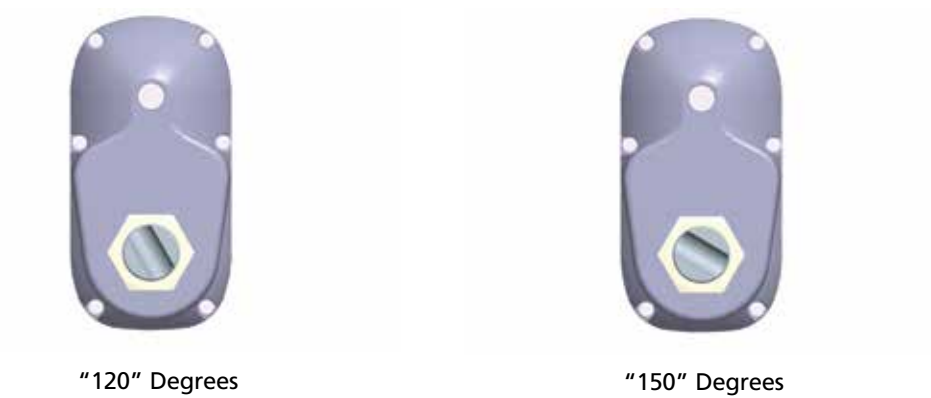
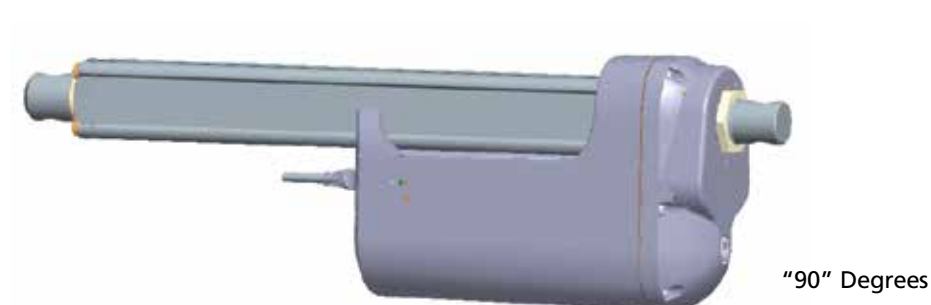
Option "A" and "B"
AISI 304



Option "C" and "D"
AISI 304



LA36 Back fixture orientation



NB. All with tolerance of $\pm 4^\circ$

Manual hand crank

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

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

Hand Crank Torque: 6-8 Nm

Hand Crank rpm: Max. 65

Piston Rod movement per turn

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

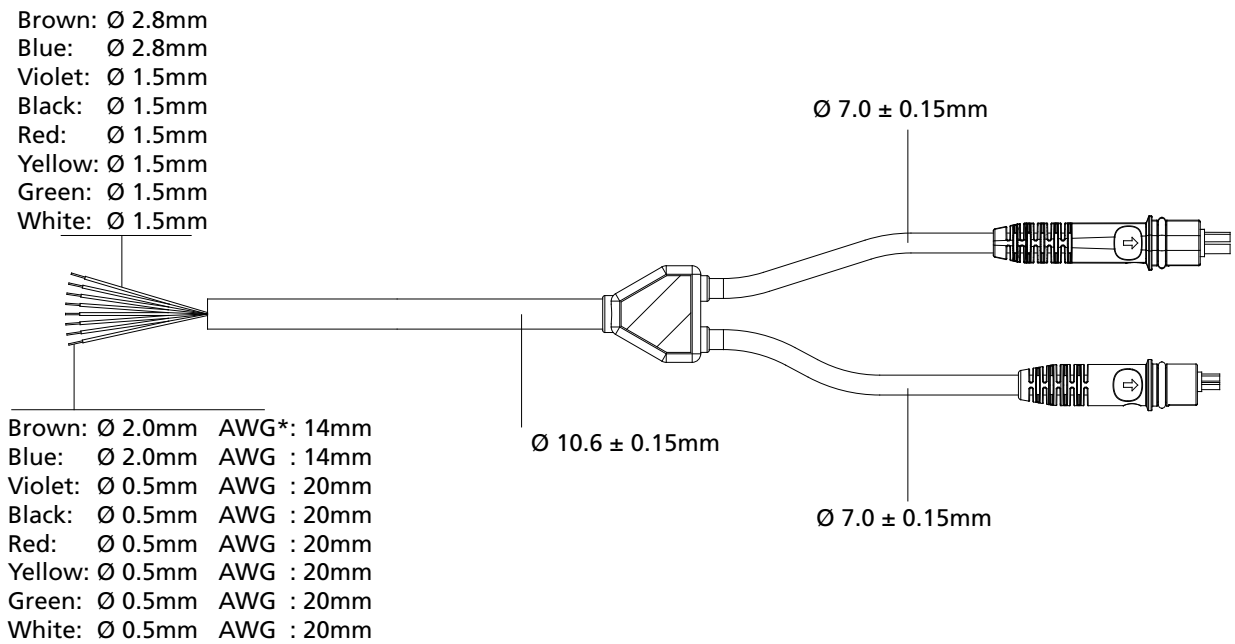


Note:

- 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.

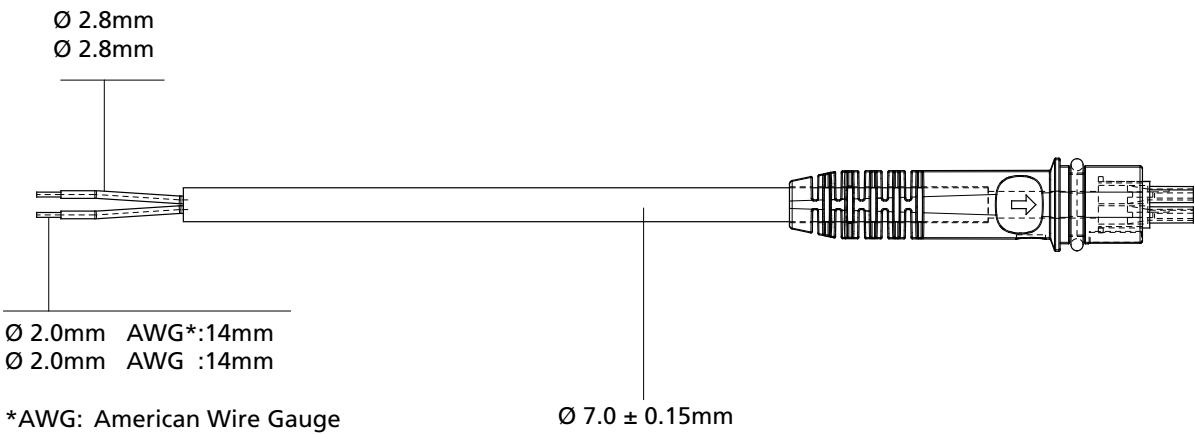
Cable dimensions

Y-cable dimensions:



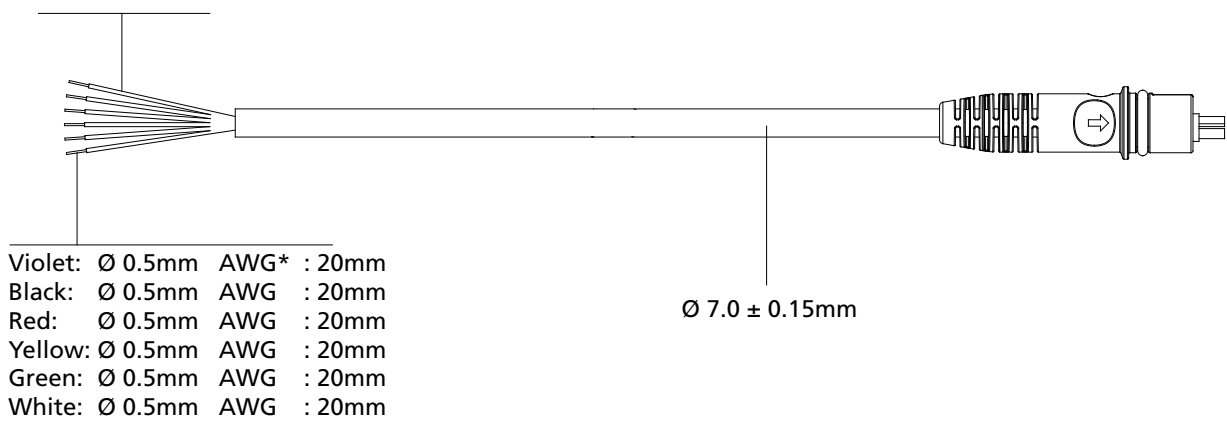
*AWG: American Wire Gauge

Power cable dimensions



Signal cable dimensions

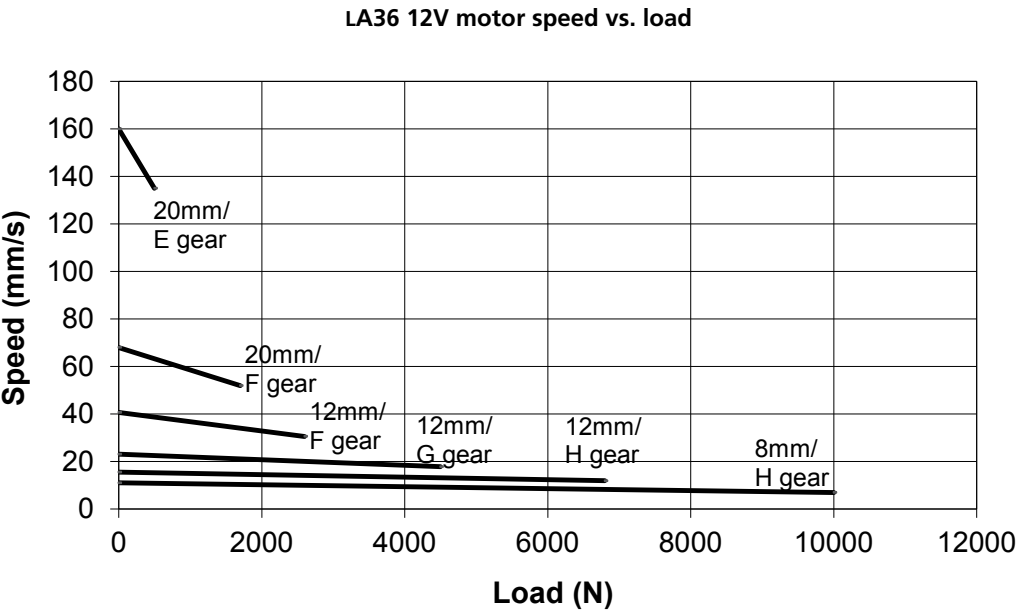
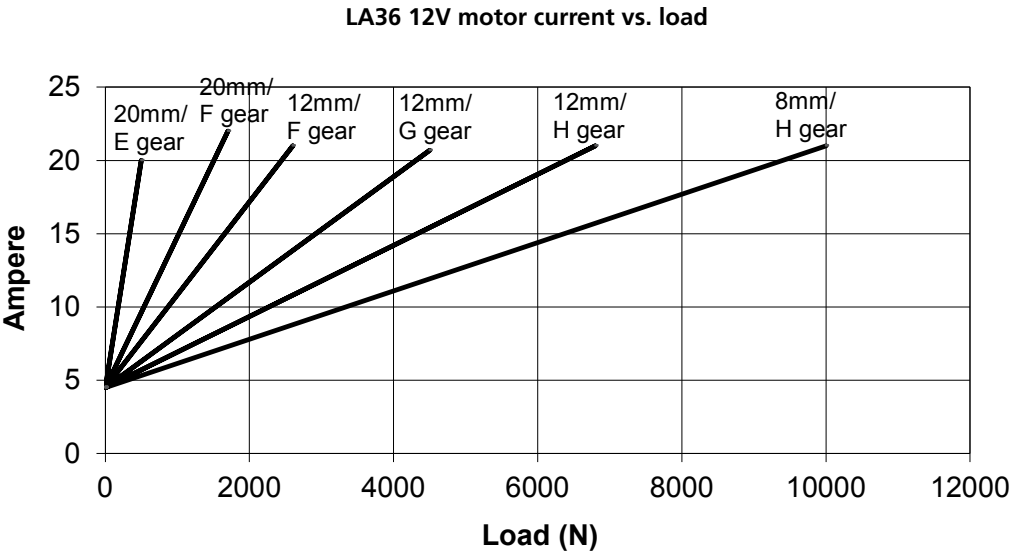
Violet: Ø 1.5mm
Black: Ø 1.5mm
Red: Ø 1.5mm
Yellow: Ø 1.5mm
Green: Ø 1.5mm
White: Ø 1.5mm



*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.

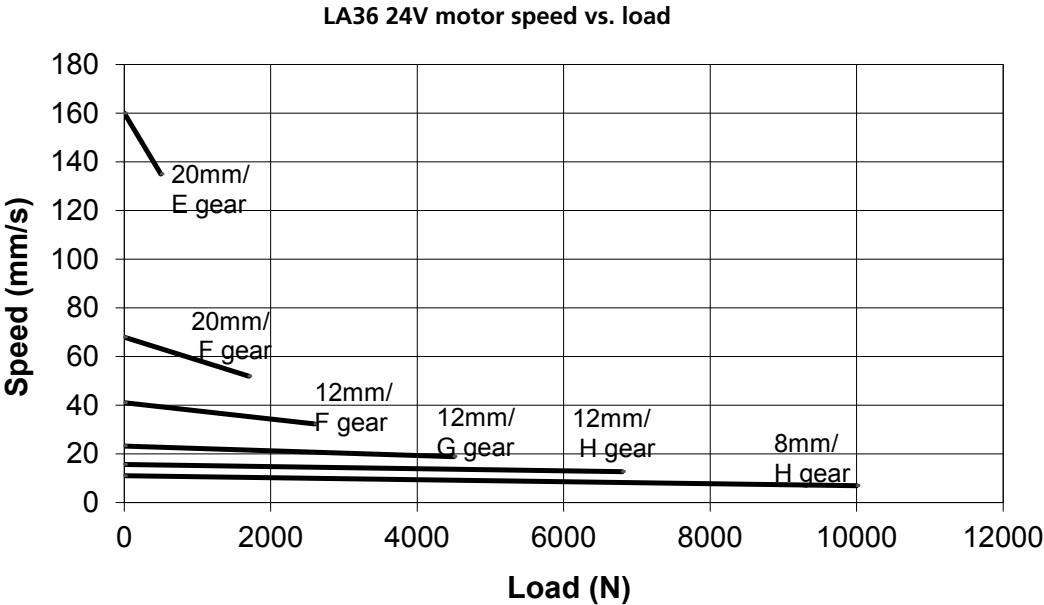
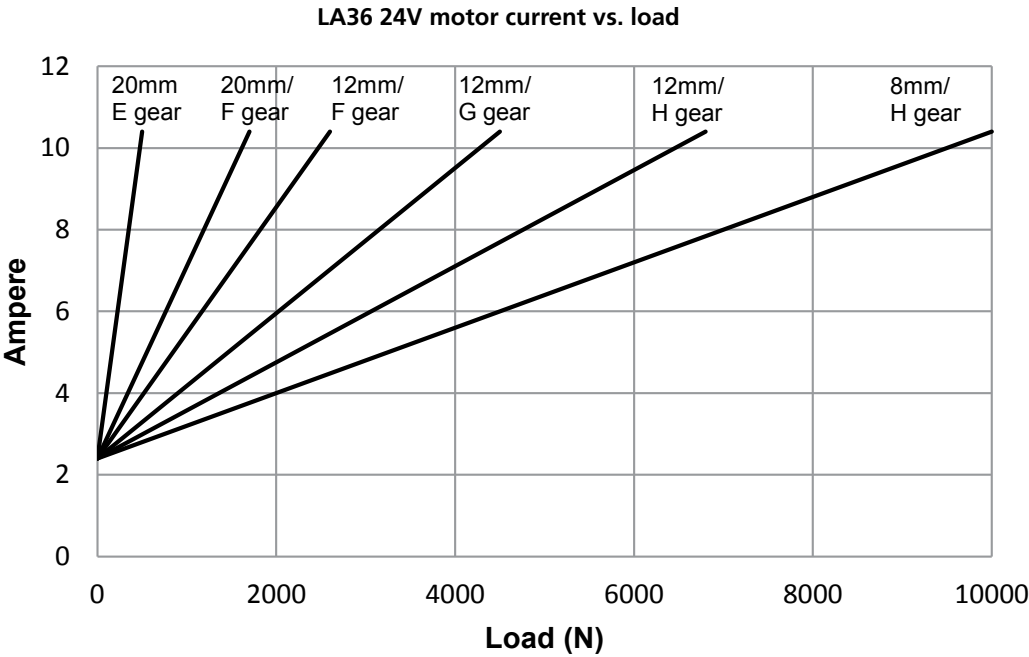


All measurements above describe the spindle pitch (e.g. 20mm) and the gear type (e.g. E gear) of the actuator.

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

Speed and current curves - 24V motor

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

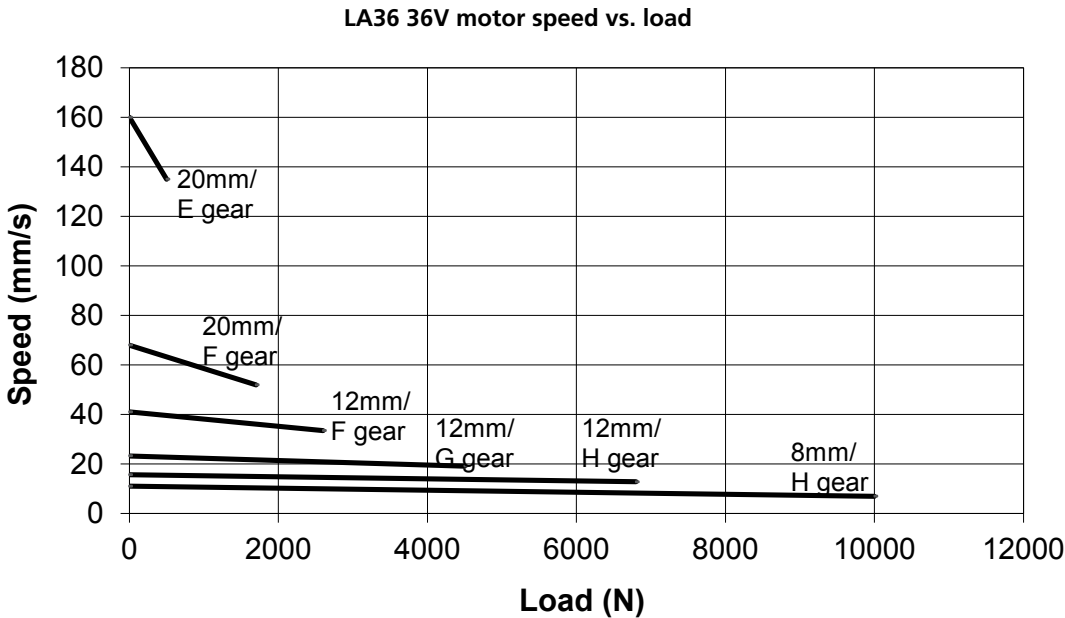
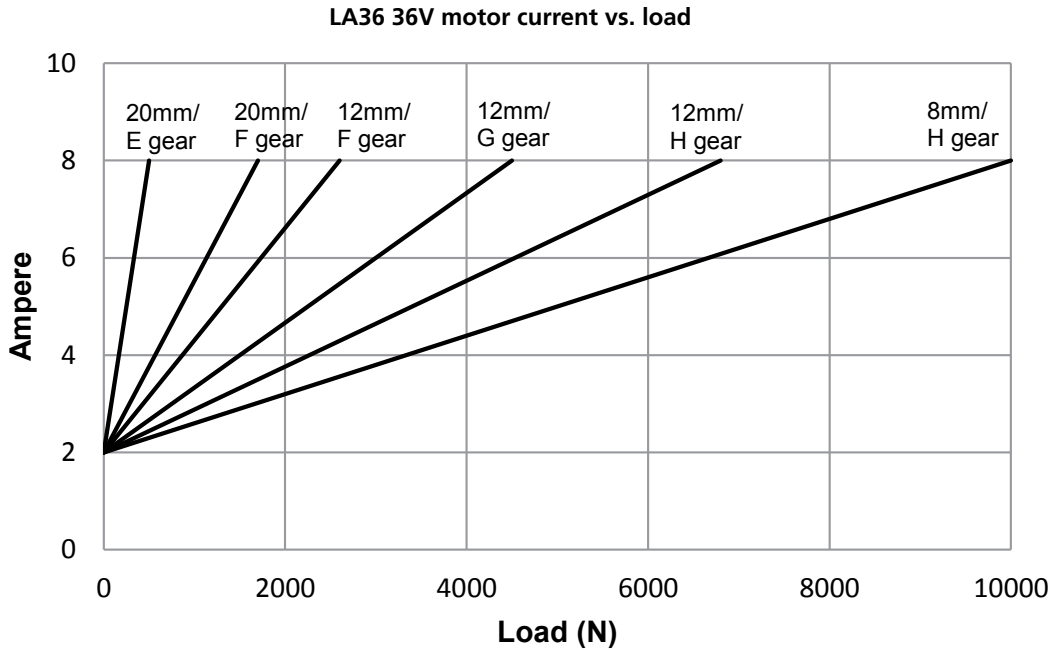


All measurements above describe the spindle pitch (e.g. 20mm) and the gear type (e.g. E gear) of the actuator.

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

Speed and current curves - 36V motor

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



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

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

Chapter 2

I/O specifications: Actuator without feedback

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

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

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

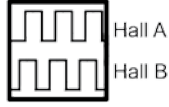
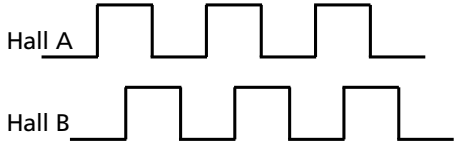
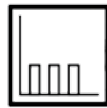
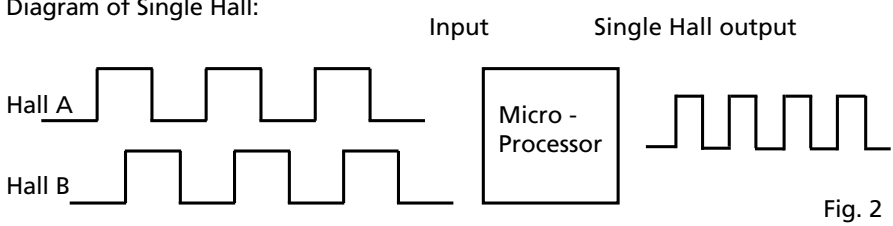
Input/Output	Specification		Comments
Description	The actuator can be equipped with Dual Hall that gives a relative positioning feedback signal when the actuator moves.		
Brown	12, 24 or 36VDC (+/-) 12V ± 20% 24V ± 10% 36V ± 10%		To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue	Under normal conditions: 12V, max. 26A depending on load 24V, max. 13A depending on load 36V, max. 10A depending on load		To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
Red	Signal power supply (+) 12-24VDC		Current consumption: Max. 40mA, also when the actuator is not running
Black	Signal power supply GND (-)		
Green	Hall B	Movement per single hall pulse: LA362C Actuator = 0.4 mm per pulse LA363C Actuator = 0.7 mm per pulse	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.
Yellow	Hall A	LA363B Actuator = 1.0 mm per pulse LA363A Actuator = 1.7 mm per pulse LA365A Actuator = 2.9 mm per pulse	
Violet	Endstop signal in		Output voltage min. $V_{IN} - 2V$ Source current max. 30mA NOT potential free
White	Endstop signal out		
Diagram of Dual Hall:	 		

Fig. 1

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

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

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, 24 or 36VDC (+/-) 12V $\pm$ 20% 24V $\pm$ 10% 36V $\pm$ 10%	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue	Under normal conditions: 12V, max. 26A depending on load 24V, max. 13A depending on load 36V, max. 10A depending on load	To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
Red	Signal power supply (+) 12-24VDC	Current consumption: Max. 60mA, also when the actuator is not running
Black	Signal power supply GND (-)	
Green	Endstop signal out	Output voltage min. $V_{IN} - 2V$ Source current max. 100mA NOT potential free
Yellow	Endstop signal in	
Violet	Analogue feedback 0-10V 0.5-4.5V	Tolerances $\pm$ 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 -
Mechanical potentiometer feedback**

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

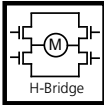


Please note that Potentiometer is not possible on variants with fast gear (Spindle pitch 20mm, H Gear).

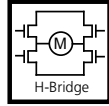
I/O specifications: Actuator with endstop signals and absolute positioning - PWM

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, 24 or 36VDC (+/-) 12V $\pm$ 20% 24V $\pm$ 10% 36V $\pm$ 10%	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue	Under normal conditions: 12V, max. 26A depending on load 24V, max. 13A depending on load 36V, max. 10A depending on load	To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
Red	Signal power supply (+) 12-24VDC	Current consumption: Max. 60mA, also when the actuator is not running
Black	Signal power supply GND (-)	
Green	Endstop signal out	Output voltage min. V_{IN} - 2V Source current max. 100mA NOT potential free
Yellow	Endstop signal in	
Violet	Digital output feedback (PNP) 10-90% 20-80%	Output voltage min. V_{IN} - 2V Tolerances $\pm$ 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 30A 24V, current limit 20A	Note: Do not change the power supply polarity on the brown and blue wires! Power supply GND (-) is electrically connected to the housing If the temperature drops below 0°C, all current limits will automatically increase to 30A
Blue	12-24VDC - (GND) Connect Blue to negative 12V ± 20% 24V ± 10% 12V, current limit 30A 24V, current limit 20A	
Red	Extends the actuator	On/off voltages: > 67% of V _{IN} = ON < 33% of V _{IN} = OFF Input current: 10mA
Black	Retracts the actuator	
Green	Not to be connected	
Yellow	Not to be connected	
Violet	Analogue feedback 0-10V	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)	Output voltage min. V _{IN} - 2V Max. current output: 12mA For more information see fig. 2, page 20
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 $\pm$ 20% 24V $\pm$ 10% 12V, current limit 30A 24V, current limit 20A	Note: Do not change the power supply polarity on the brown and blue wires! Power supply GND (-) is electrically connected to the housing
Blue	12-24VDC - (GND) Connect Blue to negative 12V $\pm$ 20% 24V $\pm$ 10% 12V, current limit 30A 24V, current limit 20A	Current limit levels can be adjusted through BusLink If the temperature drops below 0°C, all current limits will automatically increase to 30A
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.
Yellow	Endstop signal in	Before configuring virtual endstop, an absolute feedback type must be chosen. Only use one virtual endstop - keep one end open for initialisation. (See I/O specifications for endstop on page 18)

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)	Output voltage min. $V_{IN} - 2V$ Max. current output: 12mA Please be aware that when choosing single hall, feedback position readout and virtual endstops are not available in BusLink. For more information, see fig. 2, page 20
	Digital output feedback PWM: Configure any high/low combination between 0-100%	Output voltage min. $V_{IN} - 2V$ Frequency: 75Hz $\pm$ 10Hz as standard, but this can be customised. Duty cycle: Any low/high combination between 0 and 100 percent. Open drain source current max. 12mA
	Analogue feedback (4-20mA): Configure any high/low combination between 4-20mA	Tolerances $\pm$ 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	

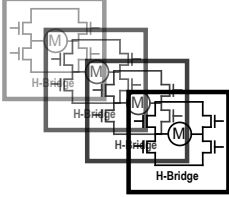


BusLink is available for IC Advanced and can be used for:
Diagnostics, manual run and configuration

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

Item number for BusLink cables: 0367999

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 $\pm$ 20% 24V $\pm$ 10% 12V, current limit 30A 24V, current limit 20A	Note: Do not change the power supply polarity on the brown and blue wires! The parallel actuators can run on one OR separate power supplies Power supply GND (-) is electrically connected to the housing
Blue	12-24VDC - (GND) Connect Blue to negative 12V $\pm$ 20% 24V $\pm$ 10% 12V, current limit 30A 24V, current limit 20A	
Red	Extends the actuator	On/off voltages: > 67% of V_{IN} = ON < 33% of V_{IN} = OFF Input current: 10mA It does not matter where the in/out signals are applied. You can either choose to connect the signal cable to one actuator OR you can choose to connect the signal cable to each actuator on the line. Either way this will ensure parallel drive
Black	Retracts the actuator	
Green	Endstop signal out	Output voltage min. V_{IN} - 2V Source current max. 100mA NOT potential free
Yellow	Endstop signal in	
Violet	Parallel communication: Violet cords must be connected together	Standby power consumption: 12V, 60mA 24V, 45mA No feedback available during parallel drive
White	Signal GND: White cords must be connected together	



BusLink is available for Parallel and can be used for:

- Configuration and diagnostics
- Service counter is available with Parallel

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

Item number for BusLink cables: 0367999

Chapter 3

Environmental tests - Climatic

Test	Specification	Comment	TRD number
Cold test	EN60068-2-1 (Ab)	<u>Storage at low temperature:</u> Temperature: -40°C Duration: 72h Not connected Tested at room temperature.	TRD0509
	EN60068-2-1 (Ad)	<u>Storage at low temperature:</u> Temperature: -30°C Duration: 2h Actuator is not activated/connected Tested at low temperature.	TRD0509
Dry Heat	EN60068-2-2 (Bb)	<u>Storage at high temperature:</u> Temperature: +90°C Duration: 72h Actuator is not activated/connected. Tested at room temperature	TRD0510
	EN60068-2-2 (Bd)	<u>Storage at high temperature:</u> Temperature: +70°C Duration: 1000h Actuator is not activated/connected Tested at high temperature. <u>Operating at high temperature:</u> Temperature: +60°C Int. max. 17% Duration: 700h Actuator is activated Tested at high temperature.	TRD0507
Change of temperature	EN60068-2-14 (Na)	<u>Rapid change of temperature:</u> 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.	TRD0501
	EN60068-2-14 (Nb)	<u>Controlled change of temperature:</u> 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.	TRD0508
Damp heat	EN60068-2-30 (Db)	<u>Damp heat, Cyclic:</u> 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.	TRD0505
	EN60068-2-3 (Ca)	<u>Damp heat, Steady state:</u> Relative humidity: 93-95% Temperature: +40 ±2°C Duration: 56 days Actuator is not activated/connected. Tested within one hour after exposure.	TRD0518
Salt mist.	EN60068-2-52 (Kb)	<u>Salt spray test:</u> Salt solution: 5% sodium chloride (NaCl) 4 spraying periods, each of 2 hours. Humidity storage 7 days after each. Actuator not activated/connected. Exposure time: 500 hours	TRD0506

Degrees of protection	EN60529 – IP66	<u>IP6X – Dust:</u> Dust-tight, No ingress of dust. Actuator is not activated.	TRD0514
		<u>IPX6 – Water:</u> Ingress of water in quantities causing harmful effects is not allowed. Duration: 100 litres pr. minute in 3 minutes Actuator is not activated.	TRD0513
		<u>IPX6 –Connected actuator:</u> Actuator is driving out and in for 3 min. 100(l/min) jet of water is placed at the wiper ring for 3 (min).	TRD0513
	DIN40050 – IP69K	<u>IPX6 –Connected actuator and push 6800 (N)</u> Actuator is driving out and in for 3 min. and Push 6800(N) at the end-pos. 100 (l/min.) jet of water is placed at the wiper ring for 3 min.	TRD0513
		<u>High pressure cleaner:</u> Water temperature: +80°C Water pressure: 80 bar Spray angle: 45° Spray distance: 100mm Duration: From any direction 10 seconds of spraying followed by 10 seconds rest. Actuator is not activated. Ingress of water in quantities causing harmful effects is not allowed.	TRD0512
	DUNK test	The actuator has been warmed up to 115°C for 20 hours. After this it is cooled down in 20°C saltwater. Cooling time: 5 minutes Opened for checking salt deposit and water.	TRD0515
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.	TRD0525

Environmental tests - Mechanical

Test	Specification	Comment	TRD number
Free fall		<u>Free fall from all sides:</u> Height of fall: 0.4 meter onto steel. Actuator not activated/connected.	TRD0511
Vibration	EN60068-2-36 (Fdb)	<u>Random vibration:</u> Short time test: 6.29g RMS Actuator is not connected Long time test: 7.21g RMS Actuator is not connected Duration: 2 hours in each direction	TRD0502
	EN 60068-2-6 (Fc)	<u>Sinus vibration:</u> Frequency 5-25Hz: Amplitude = 3.3mm pp Frequency 25-200Hz: Acceleration 4g Number of directions: 3 (X-Z-Y) Duration: 2 hours in each direction. Actuator is not activated	TRD0517
Bump	EN60068-2-29 (Eb)	<u>Bump test:</u> Level: 40g Duration: 6 milliseconds Number of bumps: 500 shocks in each of 6 directions. Actuator is not connected.	TRD0503
Shock	EN60068-2-27 (Ea)	<u>Shock test:</u> Level: 100g Duration: 6 milliseconds Number of bumps: 3 shocks in each of 6 directions. Actuator is not connected.	TRD0504

Environmental tests - Electrical

Test	Specification	Comment	TRD number
Power supply	ASAE EP455 (1990)	Operating voltages +10V - +16V Over voltage +26(V) / 5min. Reverse polarity -26(V) / 5min. Short circuit to ground 16 (V) / 5 min. Short circuit to supply 16(V) / 5 min.	TRD0522
HF-immunity	EN61000-6-2	Level: 30 V/m. at 26 MHz – 1000 mHz 80% 1 KHz	TRD0516
Emission	EN61000-6-4	Level is inside limits for 12 V motor	TRD0516
Automotive transients	ISO 7637	Load dump test only accepted on motor power connection.	TRD0521

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