TECHLINE®
IMPROVING FLEXIBILITY

Linear Actuator LA37

Data Sheet

LINAK®
WE IMPROVE YOUR LIFE

Contents

Preface

Dear User,

We are delighted that you have chosen a LINAK® product.

LINAK systems are high-tech products based on many years of experience in the manufacture and development of actuators, lifting columns, desk frames, electric control boxes, controls, batteries, accessories and chargers.

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

We are convinced that your LINAK product/system will give you many years of problem-free operation.

Before our products leave the factory, they undergo both function and quality testing. Should you, nevertheless, experience problems with your product/system, you are always welcome to contact your supplier.

LINAK subsidiaries and some distributors situated all over the world have authorised service centres, which are always ready to help you. Locate your local contact information on the back page.

LINAK provides a warranty on all products. (See warranty section).

This warranty, however, is subject to correct use in accordance with the specifications, maintenance being done correctly, and any repairs being carried out at a service centre, which is authorised to repair LINAK products.

Changes in installation and use of LINAK systems can affect their operation and durability. The products may only be opened by authorised personnel.

This User Manual has been written based on the present technical knowledge. LINAK reserves the right to carry out technical modifications and keeps the associated information updated.

LINAK A/S

Terms of use

LINAK® takes great care in providing accurate and up-to-date information on its products. However, the user is responsible for determining the suitability of LINAK products for a specific application.

Due to continual development, LINAK products are subject to frequent modifications and changes. LINAK reserves the rights to conduct modifications, updates, and changes without any prior notice. For the same reason, LINAK cannot guarantee the correctness and actual status of imprinted information on its products.

LINAK uses its best efforts to fulfil orders. However, for the reasons mentioned above, LINAK cannot guarantee availability of any particular product at any given time. LINAK reserves the right to discontinue the sale of any product displayed on its website or listed in its catalogues or in other written material created and produced by LINAK, LINAK subsidiaries, or LINAK affiliates.

All sales are subject to the 'Standard Terms of Sale and Delivery for LINAK A/S' available on LINAK websites.

Introduction

Powerful electric linear actuator designed to handle high loads and demanding environments. It delivers long-lasting reliability as well as a wide choice of industrial control interfaces.

Safety instructions

Please read this safety information carefully.

Be aware of the following three symbols throughout the document:

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

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

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

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

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

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

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

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

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

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

During operation, please be aware of the following:

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

When the equipment is not in use:

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

Classification

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

Warnings

- Do not sideload the actuator.
- When mounting the actuator in the application ensure that the bolts can withstand the wear and that they are secured safely.
- If irregularities are observed, the actuator must be replaced.
- The standard actuator (without Integrated Controller) without clutch, is not allowed to run into a mechanical block -before reaching the end of stroke.

Recommendations

- Do not place load on the actuator housing.
- Prevent impact or blows, or any other form of stress to the housing.
- Ensure that the cable cover is mounted correctly. Use 3.5 Nm torque.
- Ensure that the duty cycle and the usage temperatures for LA37 actuators are respected.
- Ensure that the cable cannot be squeezed, pulled or subjected to any other stress.
- Furthermore, it will be good practice to ensure that the actuator is fully retracted in the “normal” position. The reason is that there will be a vacuum inside the actuator if it is extended which over time can lead to water entering the actuator.

Features

- 12 / 24 / 48 V DC Brushed motor permanent magnetic motor
- Load from 10,000 N - 15,000 N
- Max. speed 10 mm/sec. depending on load and spindle pitch
- Stroke length from 100 mm to 600 mm (601 -1,000 mm as special item)
- Built-in endstops reached function
- Highly efficient acme thread spindle
- Heavy duty aluminium housing for harsh conditions
- Protection class: IP66 for outdoor use (dynamic). Furthermore, the actuator can be washed down by a high pressure cleaner (IP69K - static)
- Highly efficient acme thread spindle
- Static holding load up to 45 kN in push and pull
- Dynamic wind stress loads 15 kN push/pull 100,000 times
- Hand crank for manual operation
- Integrated brake, high self-lock ability
- Endplay - See Technical Specifications
- Non-rotating piston rod eye
- Noise level: 76 dB (A). Measuring method: DS/EN ISO 8746 (actuator not loaded)
- Current monitoring
- Off-highway Features:
    - 12 or 24 V DC brushed permanent magnetic motor
    - Load up to 15,000 N (depending on the spindle pitch)
    - Max. speed 10 mm/sec.
    - Reinforced aluminium housing for harsh conditions
    - IPC-A-610 Class 3 (High-performance electronic products)
    - IP54 without cable mounted
      IP69K with cable mounted with shell or moulded cable

An Off-highway vehicle is intended for use on steep or uneven ground and includes those used for construction or agriculture. They are specifically designed for off-road use.

Quad bikes, dirt bikes, dune buggies and other types of all-terrain vehicles are also types of Off-highway vehicles, although their function is very different from motor vehicles designed for industrial and farming use.

For more information about I/O, please see the I/O interface user manual

Options in general

- Back fixture can be ordered in steps of 90 degrees
- Exchangeable cables in different lengths
- Hall effect sensor
- Analogue or digital feedback for precise positioning
- Different back fixtures and piston rod eyes
- Endstop reached signals
- Built-in Zero Point or endstop switch initialisation principle
- IC options including:
    - I/O
    - Ethernet/IP
    - Modbus TCP/IP
    - Modbus RTU
    - IO-Link
    - LIN bus
    - CAN SAE J1939
    - CANopen
    - Off-highway LIN bus (contact LINAK sales)
    - Off-highway CAN SAE J1939
    - Off-highway CANopen

(see specific interface user manuals at the TECHLINE webpage for Connection Diagrams and I/O Specifications)

- PC configuration tool (Actuator Connect™ and BusLink)

Usage

- Duty cycle for actuators with a 0-600 mm stroke length is 10%
- Duty cycle for actuators with a 601-1,000 mm stroke length (special item) is 5%
- Ambient operating temperature — Full performance from +5 °C to +40 °C
  -30 °C (reduced load 50%) to + 85 °C (reduced duty cycle 10%)
- Storage temperature — -40 °C to +70 °C
  -40 °C to +85 °C for 72 hours
  -55 °C to +95 °C for 24 hours for Standard platform
  -55 °C to +105 °C for 24 hours for Integrated Control platform
  Acclimatization before usage

  Actuator is not activated/connected.
- Relative humidity — Full performance from 20% to 80% - non-condensing
  (Actuator is neither activated nor connected)
- Cyclic state — 93% to 98% - non-condensing +25 °C to +55 °C for 12 hours
- Steady state — 93% to 95% - non-condensing +40 °C for 56 days
- Atmospheric pressure — 700 to 1060 hPa
- Meters above sea level — Max. 3,000 meters
- Off-highway:
  - For applications operated at constantly low temperatures it is recommended to use a stronger version of the actuator to reduce the current consumption that in some combinations can be up to 3 times higher (at -40° Celsius)
  - Testet according to: ISO14982-1 / Agricultural and forestry machinery - Electromagnetic compatibility - Part 1: General EMC requirements (clamped capacitor circuit)
  - Compliant with: ROHS2 : 2011/65/EU: Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment EMC Directive - 2014/30/EU

Ordering example

37 080 200 0 A 01 B 6 - 6 1 2 H 3 XXXX A C S 0 0 0

Actuator type
37 = LA37

Spindle type
025 = 2.5 mm
080 = 8 mm

Stroke length
200 = XXX Length in mm (50-999)
A00 = 1000 Length in mm

Safety
0 = No safety nut

Feedback
0 = No Feedback
A = Hall Potentiometer
H = Dual Hall
9 = Hall Potentiometer, 2-wire
K = Single Hall
X = Special

Platform

See Current limits and Current cut-offs for availability of voltage

6-pin

Endstop switch principle
01 = Standard with power switch
04 = Modbus
06 = LIN bus
07 = CAN SAE J1939
08 = CANopen

Zero Point
16 = LIN bus
17 = CAN SAE J1939
18 = CANopen

9-pin

Zero Point
B3 = I/O Basic
C3 = I/O Customised
F3 = I/O Full
0B = IO-Link
14 = Modbus RTU

Zero Point with split supply
A7 = CAN SAE J1939
A8 = CANopen
0E = Modbus TCP/IP
2E = Ethernet/IP
4E = Profinet

18-pin Off-highway
C6* = LIN bus **
D6* = CAN SAE J1939
E6* = CANopen
XX = Special

Motor type
1 = 12 V DC
2 = 24 V DC
3 = 48 V DC

* Requires Housing option 'C' IP66 Off-highway, also only available with Motor Type 1 or 2
** Please contact LINAK for further information

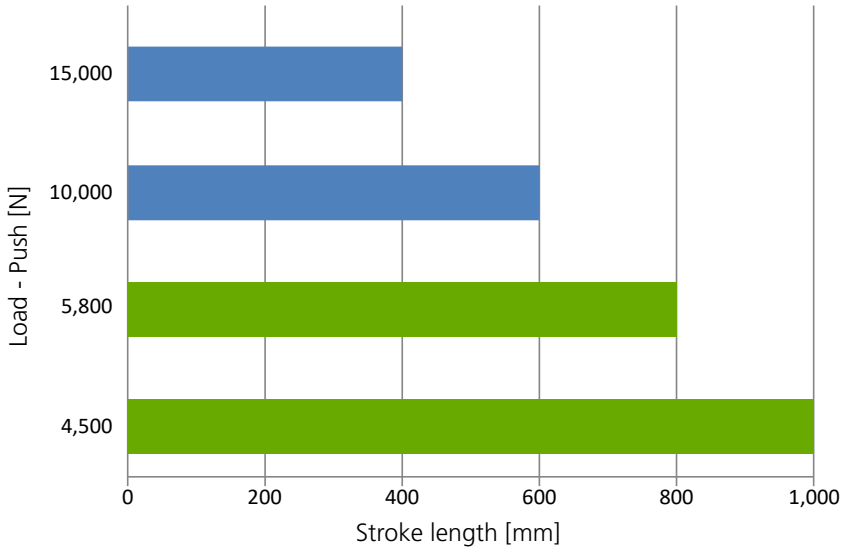
Housing	**6**	=	IP66 - Reinforced house	C*	=	IP54 - Off-highway house
Not used	**-**	=	Not used			
Colour	**6**	=	Dark Olivish Grey NCS S7000-N			
Back fixture	**1**	=	0°	X	=	Special
	2	=	90°			
Piston rod eye	**2**	=	Solid	6	=	Ball eye
	4	=	Male Adapter (Outer thread)	X	=	Special
Gear	**H**	=	Ratio 1:46			
Brake	3	=	Push/Pull			
Built-in dimension	xxxx	=	Measured in mm			
Endstop reached output	**A**	=	A_HIGH / A_HIGH	J	=	A_HIGH / LOW
	B	=	A_LOW / A_HIGH	K	=	A_LOW / LOW
	C	=	A_HIGH / A_LOW	L	=	A_HIGH / HIGH
	D	=	A_LOW / A_LOW	M	=	A_LOW / HIGH
	E	=	LOW / A_HIGH	N***	=	LOW / LOW
	F	=	HIGH / A_HIGH	O	=	HIGH / LOW
	G	=	LOW / A_LOW	P	=	LOW / HIGH
	H	=	HIGH / A_LOW	Q	=	HIGH / HIGH
				X	=	Special
Plug type	0**	=	No plug (when no cable is chosen)	H	=	AMP
	J	=	Deutsch	K	=	AMP Super Seal
	9	=	Deutsch - Moulded	7	=	AMP Super Seal - Moulded
	C	=	Flying leads	E	=	M12 Y Ethernet/IP
	N	=	M12 IO-Link	R	=	M12 Modbus
				X	=	Special
Cable	0**	=	No cable selected	A	=	Mounted with 90° angled connectors
	S	=	Straight cable	Y	=	Y-Cable (combined power and signal cable)
				X	=	Special

*	Requires Platform option 18-pin Off-highway - Only available with Motor Type 1 or 2
**	Shall be chosen with 'Off-highway'
***	Mandatory for CAN SAE J1939, CANopen, LIN bus, Modbus and IO-Link

Parallel mode	**0**	=	The system is NOT parallel	2-8	=	Critical parallel (number of actuators in the parallel system)
SW config.	**0**	=	Standard software	X	=	Special software
Short BID	0	=	Standard	A*	=	Short (conform with LA36)

***** Only optional with Spindle type 080

Load vs stroke length



LA37 is available with stroke lengths from 601 to 1,000 mm as special item. Please note:

- For applications that only operate in pull - the limitations are 1,000 mm stroke with both 10,000 and 15,000 N load
- Safety factor 2

Technical specifications

12 V

Load max. (N)	Self-lock min. (N)	Pitch (mm/ spindle rev.)	Hall resolution (mm/count)	Endplay (mm)	Typical speed (mm/s)		Standard stroke lengths (mm)	Typical amp. (A)	
					No load	Full load		No load	Full load
15000	20000	2.5	0.034	2	3.5	2.2	100-400	4.0	22.5
10000	15000	2.5	0.034	2	3.5	2.8	400-600	4.0	15.0
10000	15000	8.0	0.110	2	11.0	9.0	100-600	4.0	23.0

24 V

Load max. (N)	Self-lock min. (N)	Pitch (mm/ spindle rev.)	Hall resolution (mm/ count)	Endplay (mm)	Typical speed (mm/s)		Standard stroke lengths (mm)	Typical amp. (A)	
					No load	Full load		No load	Full load
15000	20000	2.5	0.034	2	3.5	2.8	100-400	2.0	13.0
10000	20000	2.5	0.034	2	3.5	3.0	400-600	2.0	8.0
10000	15000	8.0	0.110	2	11.0	9.0	100-600	2.0	13.0

48 V

Load max. (N)	Self-lock min. (N)	Pitch (mm/ spindle rev.)	Hall resolution (mm/count)	Endplay (mm)	Typical speed (mm/s)		Standard stroke lengths (mm)	Typical amp. (A)	
					No load	Full load		No load	Full load
15000	20000	2.5	0.034	2	3.5	2.5	100-400	1.0	6.0
10000	20000	2.5	0.034	2	3.5	3.2	400-600	1.0	4.0
10000	15000	8.0	0.110	2	11.0	9.0	100-600	1.0	6.0

See Current limits and Current cut-offs for availability of voltage

- To ensure maximum self-locking ability, please make sure that the motor is shorted when stopped Actuators with Integrated Controller provide this feature, as long as the actuator is powered.

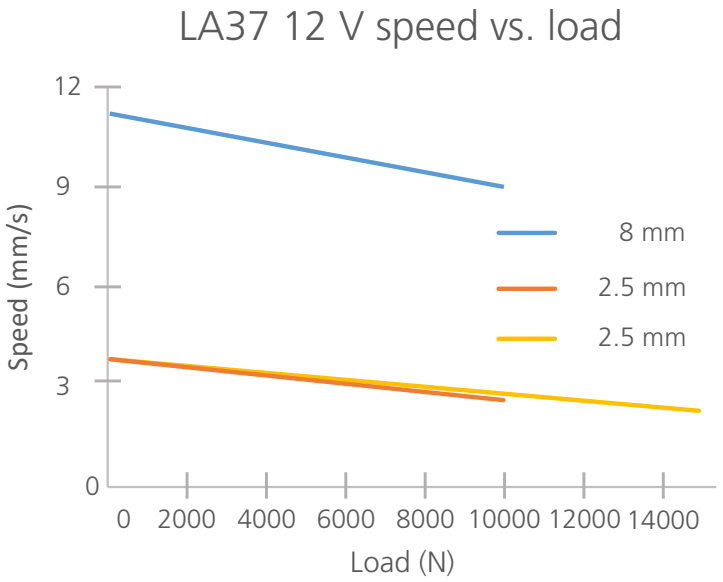
- When using soft stop on a DC-motor, a short peak of higher voltage will be sent back towards the power supply. It is important when selecting the power supply that it does not turn off the output when this backwards load dump occurs.

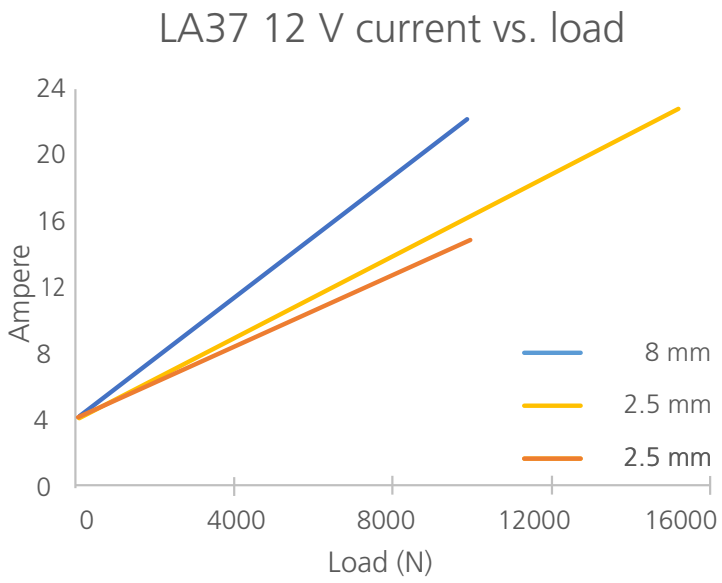
A Hall pulse consists of two Hall counts. A Hall count occurs every time the signal changes state (high to low or vice versa).

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 of 20°C.

Speed and current curves

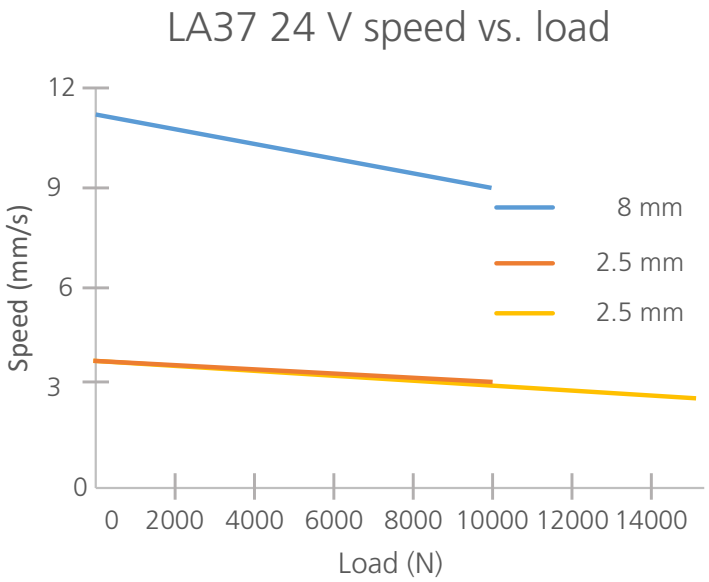
The typical values below are made with a nominal power supply of 12 V DC and an ambient temperature of 20˚C.

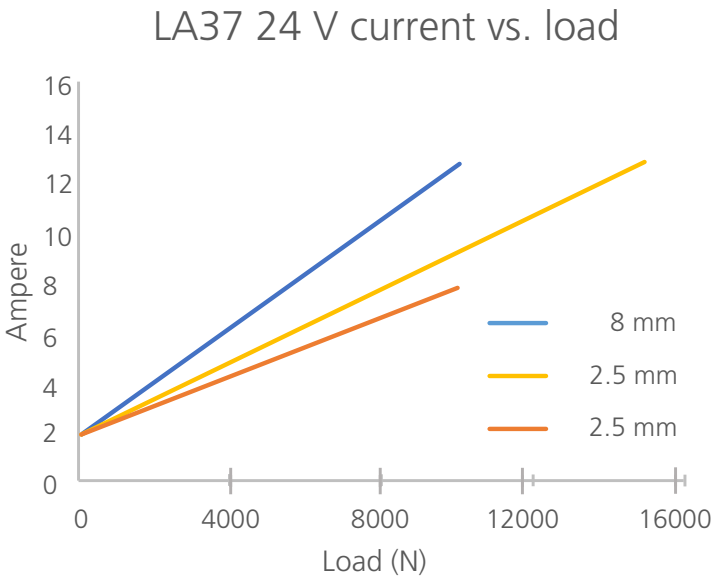




Speed and current curves

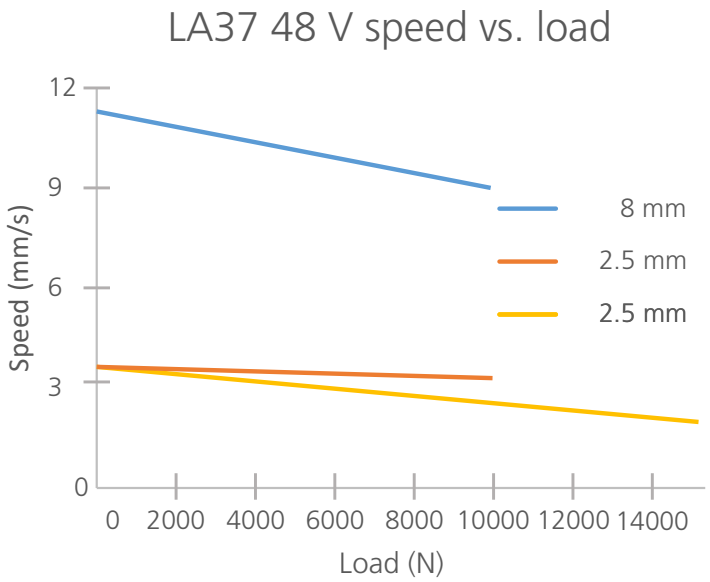
The typical values below are made with a nominal power supply of 24 V DC and an ambient temperature of 20˚C.

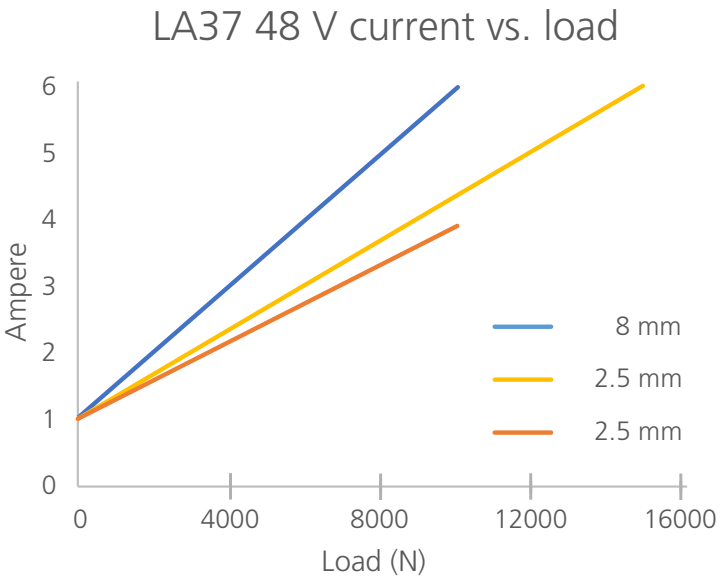




Speed and current curves

The typical values below are made with a nominal power supply of 48 V DC and an ambient temperature of 20˚C.





Current limits

As described in the algorithm on previous page.

Platform		12 V	24 V	48 V	Reference temperature: 0°C
B3 C3 F3	I/O Basic I/O Customised I/O Full	26 A	13 A	8 A	Above
		26 A	26 A	13 A	Below
A6	LIN bus	-	13 A	8 A	Above
		-	26 A	13 A	Below
0B	IO-Link	-	16 A	-	Above
		-	26 A	-	Below
14	Modbus RTU	-	16 A	8 A	Above
		-	26 A	15 A	Below
C6 D6 E6	LIN bus Off-highway CAN SAE J1939 Off-highway CANopen Off-highwayv	26 A	13 A	-	Above
		26 A	26 A	-	Below

Platform		12 V	24 V	48 V	Reference temperature: 0°C
A7 A8	CANbus J1939 CANopen	-	13 A	8 A	Above
		-	26 A	13 A	Below
0E 2E 4E	Modbus TCP/IP Ethernet/IP Profinet	-	16 A	8 A	Above
		-	26 A	16 A	Below

Max. current

The current is not limited by the actuator. Below is the anticipated consumption at max. load.
See: Recommended fuse for actuators without Integrated Controller.

Platform		12 V	24 V	48 V	Reference temperature: 0°C
01	Standard with power switch	26 A	13 A	8 A	Above
		26 A	13 A	8 A	Below

Current cut-offs

The principle behind the current cut-off measurement is an ‘above limit’ and a ‘below limit’ accumulating counter. When the time-out counter reaches a specific value the current cut-off goes into effect. The time-out value is pre-set at 200 ms.

Platform		**12 V**	**24 V**	**48 V**	**Reference temperature: 0°C**
04	Modbus	-	13 A	-	Above
		-	13 A	-	Below
06	LIN bus	30 A	-	-	Above
		30 A	-	-	Below
07 08	CAN SAE J1939 CANopen	30 A	20 A	-	Above
		30 A	25 A	-	Below

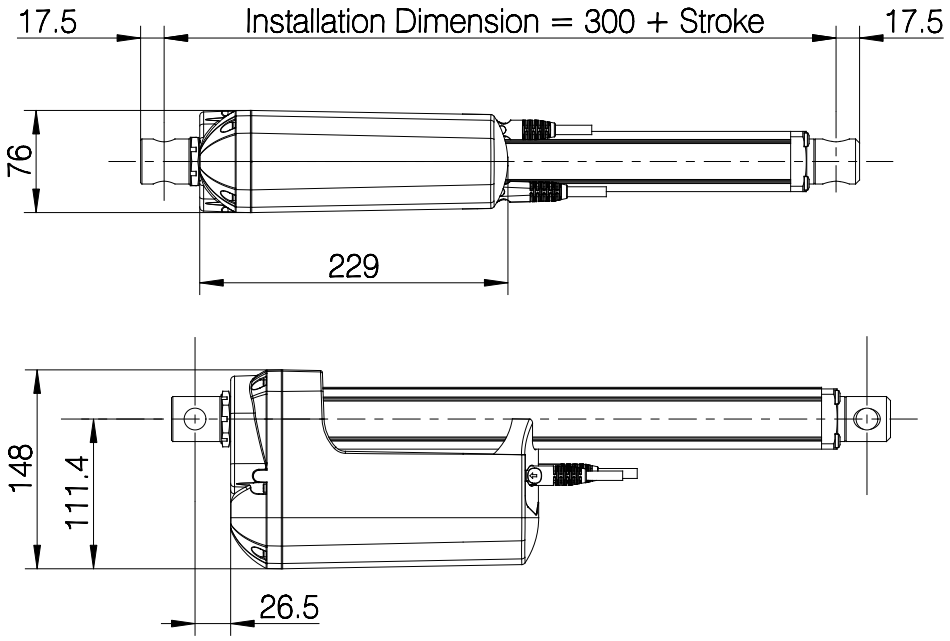
Platform		**12 V**	**24 V**	**48 V**	**Reference temperature: 0°C**
16	LIN bus	30 A	-	-	Above
		30 A	-	-	Below
17 18	CAN SAE J1939 CANopen	30 A	20 A	13 A	Above
		30 A	25 A	15 A	Below

Stroke and built-in tolerances

Platforms		Stroke tolerance	Example for 200 mm stroke	BID tolerance	Example for 400 mm BID
01	Standard with power switch	+0/-4 mm	196 to 200 mm	± 4 mm	396 to 404 mm
04 06 07 08	Modbus LIN bus CAN SAE J1939 CANopen	+0/-6 mm	194 to 200 mm	± 4 mm	396 to 404 mm
16 17 18	LIN bus CAN SAE J1939 CANopen	± 2 mm	198 to 202 mm	± 2 mm	398 to 402 mm
B3 C3 F3 A6 0B 14 A7 A8 4E 2E 0E C6 D6 E6	I/O Basic I/O Customised I/O Full LIN bus IO-Link Modbus RTU CAN SAE J1939 CANopen Profinet Ethernet/IP Modbus TCP/IP LIN bus Off-highway CAN SAE J1939 Off-highway CANopen Off-highway	± 2 mm	198 to 202 mm	± 2 mm	398 to 402 mm

Built-in dimensions

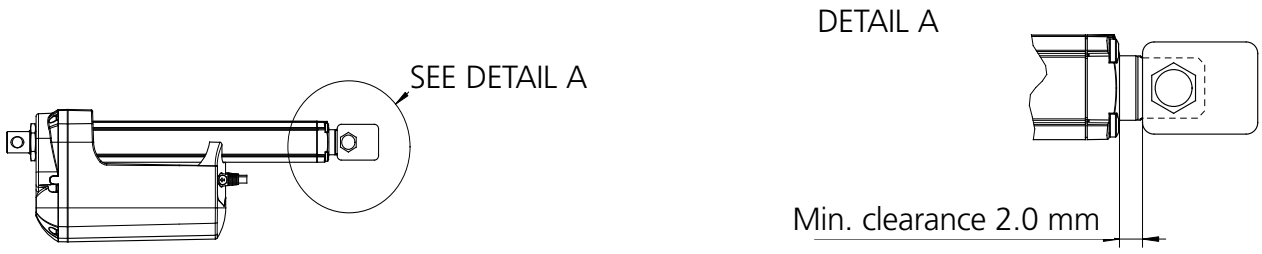
All dimensions are in mm



The above dimensions apply for all LA37 piston rod eyes and back fixtures.

Keep a clearance when mounting a bracket

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



With Zero Point the minimum stroke is 70 mm.
The Zero Point initialisation zone is located between 35-70 mm going from the most inward position.
The movement passing the zone has to be stable for the initialisation to succeed - also, no virtual limits can be set in the initialisation zone.

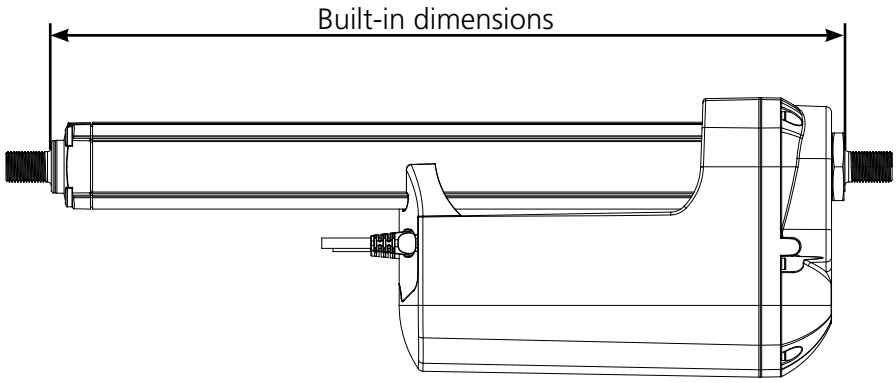
Built-in dimensions

All dimensions are in mm

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

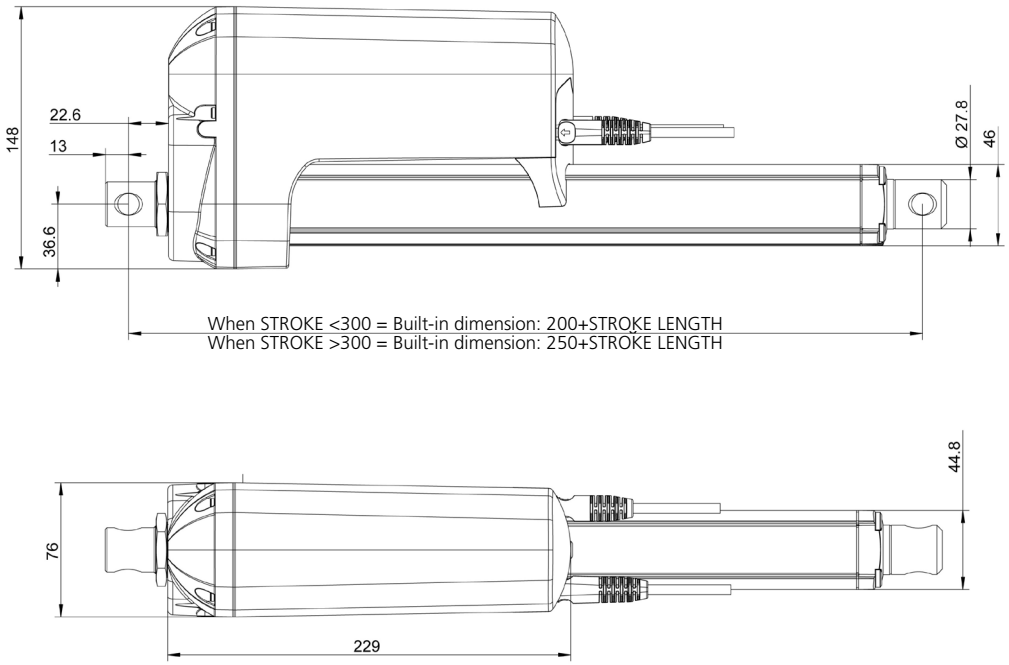
	Piston rod eye	Ball eye Ø20 H7 / to the centre of the hole	Ball eye Ø19.2 / to the centre of the hole	Solid Ø16.2 mm / to the centre of the hole	Solid Ø19.2 mm / to the centre of the hole	Male adapter M16 X 1.5 / from the surface*	Male adapter M20 X 1.5/ from the surface*
Back fixture		Stroke from 100 to 600	Stroke from 100 to 600	Stroke from 100 to 600	Stroke from 100 to 600	Stroke from 100 to 600	Stroke from 100 to 600
Solid Ø16.2 mm (0° and 90°) / to the centre of the hole		316 + stroke	316 + stroke	300 + stroke	300 + stroke	287 + stroke	287 + stroke
Solid Ø19.2 mm (0° and 90°) / to the centre of the hole		316 + stroke	316 + stroke	300 + stroke	300 + stroke	287 + stroke	287 + stroke
Male adapter M20 / from the surface*		297 + stroke	297 + stroke	281 + stroke	281 + stroke	267 + stroke*	267 + stroke*

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



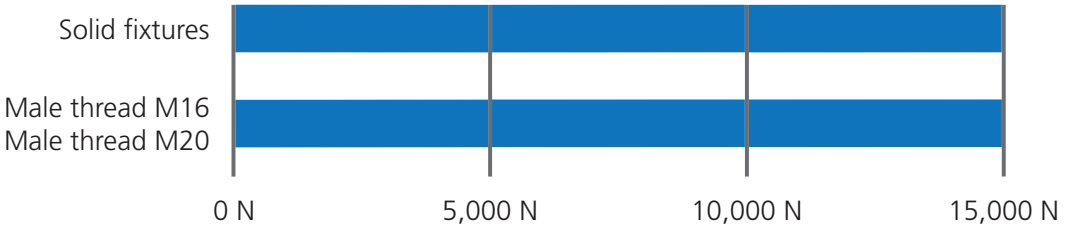
Built-in dimensions For Shot BID option

All dimensions are in mm.



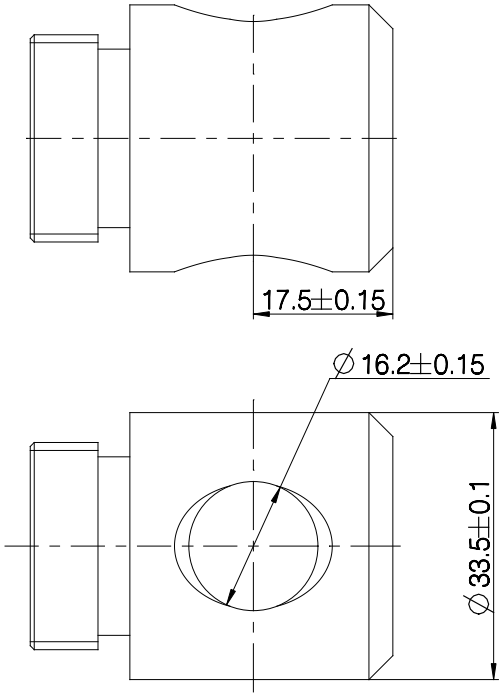
	Piston rod eye	Solid Ø12.2 mm (0° and 90°)		Solid Ø12.9 mm (0° and 90°)	
Stroke length		**<=300**	**>300**	**<=300**	**>300**
Back fixture		**Solid to the centre of the hole**		**Solid to the centre of the hole**	
Solid Ø12.2 mm	**Solid to the centre of the hole**	200 + stroke	250 + stroke	200 + stroke	250 + stroke
Solid Ø12.9 mm	**Solid to the centre of the hole**	200 + stroke	250 + stroke	200 + stroke	250 + stroke

Durability for piston rod eyes and back fixtures

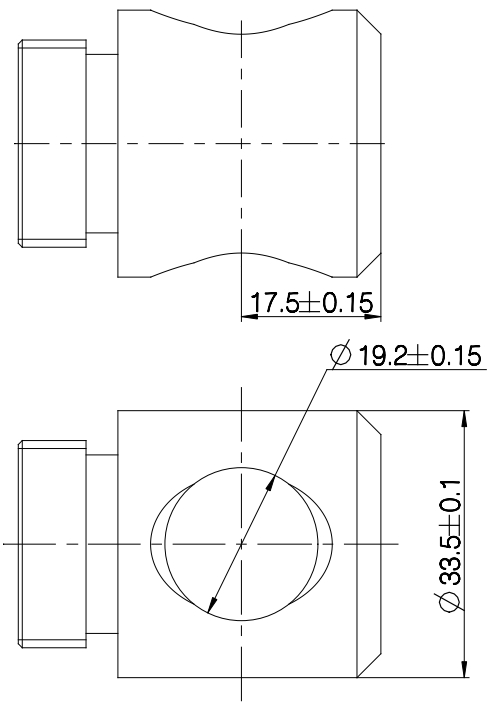


Piston rod eyes

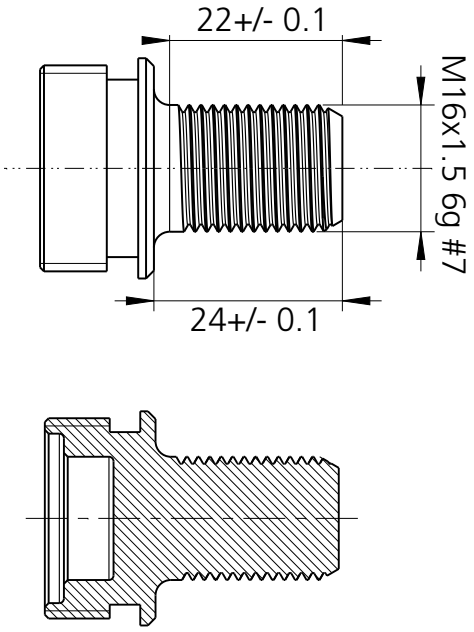
Option "2"
LINAK P/N: 0361387
Free-cutting steel with galvanised surface



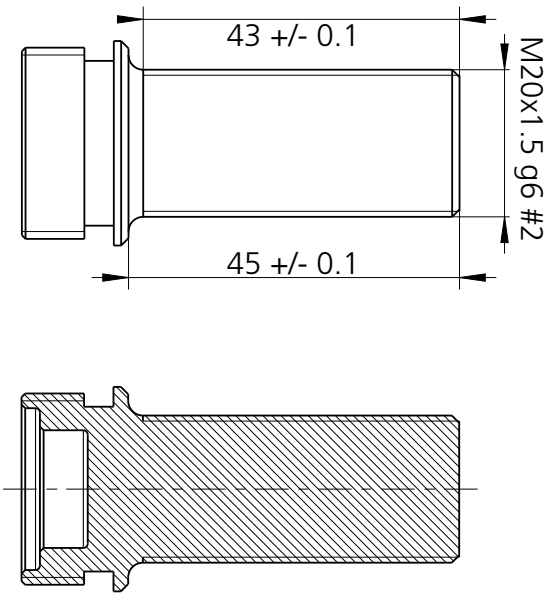
Option "2"
LINAK P/N: 0361393
Free-cutting steel with galvanised surface



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



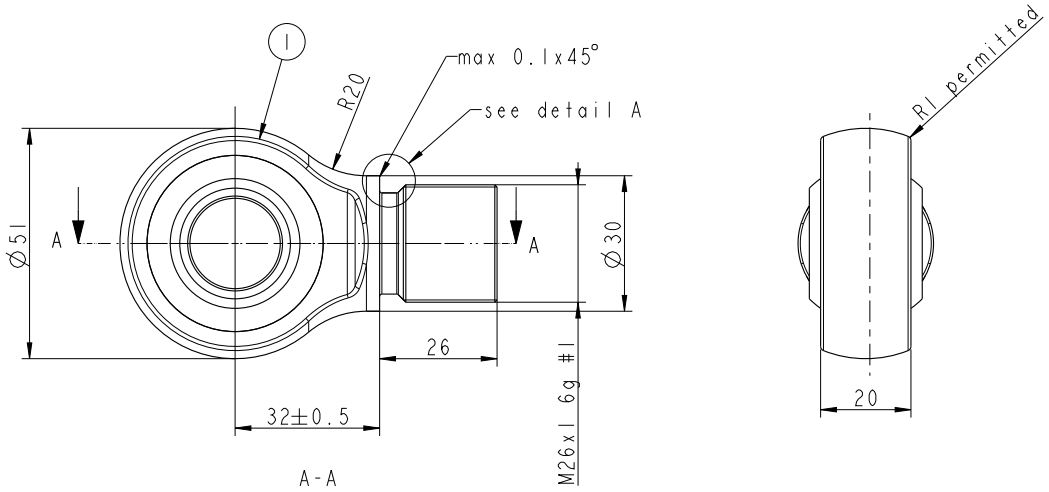
Option "4"
LINAK P/N: 0371044
AISI 303



The piston rod eye is only allowed to turn 0 - 180 degrees.

Piston rod eyes

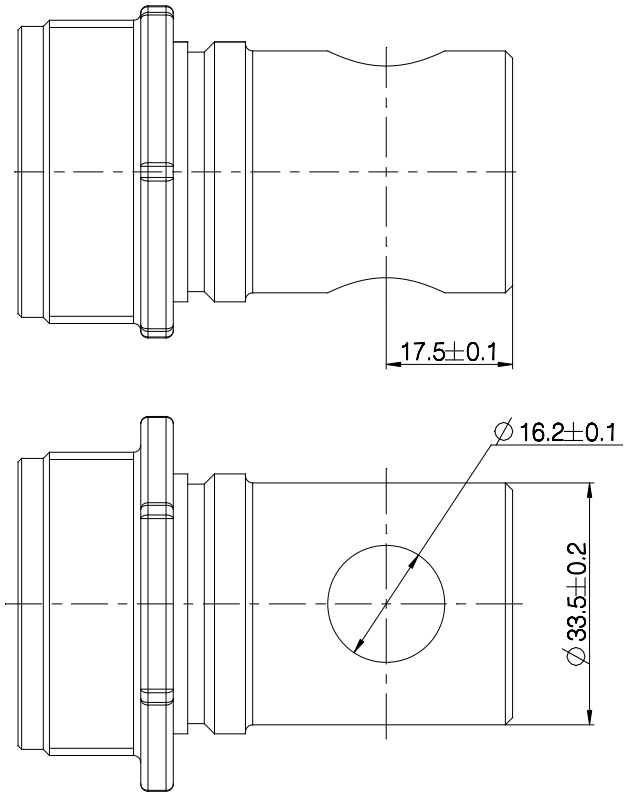
Option “6”
LINAK P/N: 0361568 (Ø20H7)
0361571 (Ø19.2 ± 0.1)
AISI 304



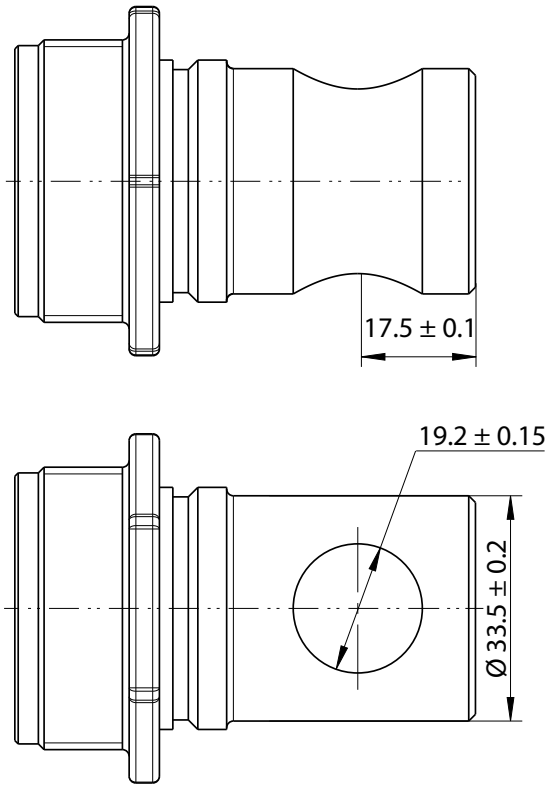
The piston rod eye is only allowed to turn 0 - 180 degrees.

Back fixtures

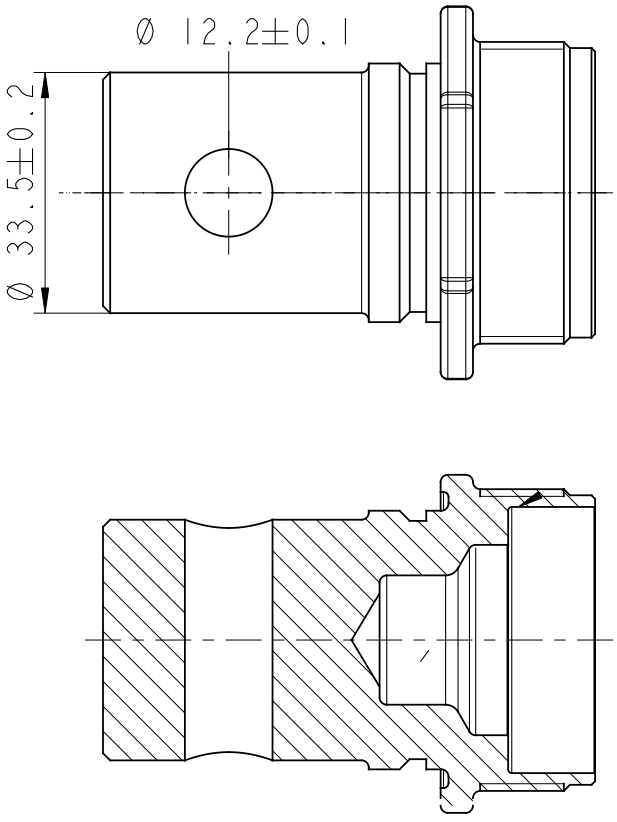
Option "1&2"
LINAK P/N: 0371019
Free-cutting steel with galvanised surface



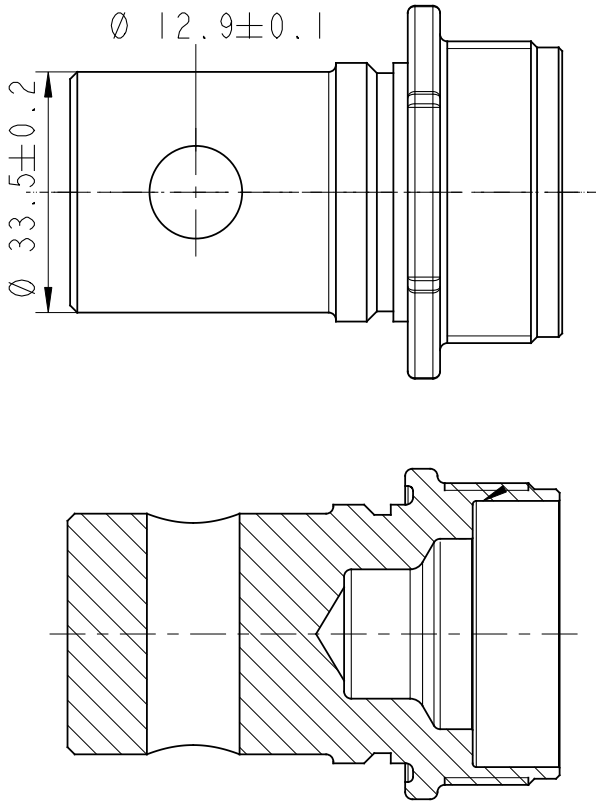
Option "3&4"
LINAK P/N: 0371040
Free-cutting steel with galvanised surface



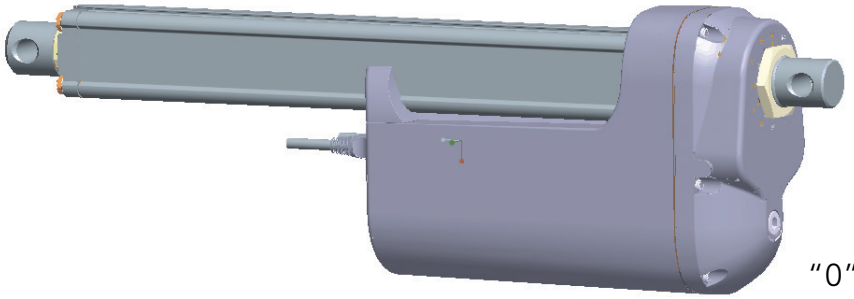
Option "1&2" -for Short BID option 'A' only
LINAK P/N: 0371056
Free-cutting steel with galvanised surface



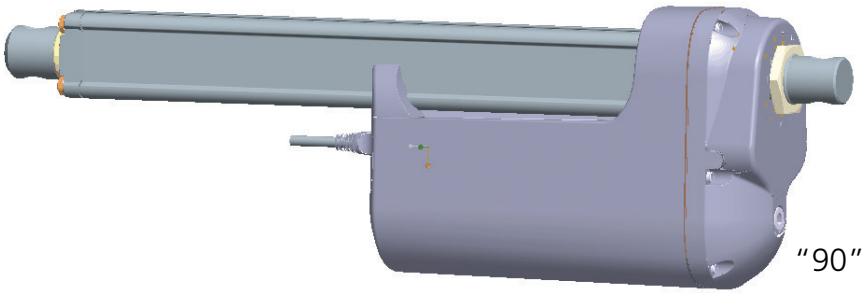
Option "1&2" -for Short BID option 'A' only
LINAK P/N: 0371057
Free-cutting steel with galvanised surface



Back fixture orientation



"0" Degrees



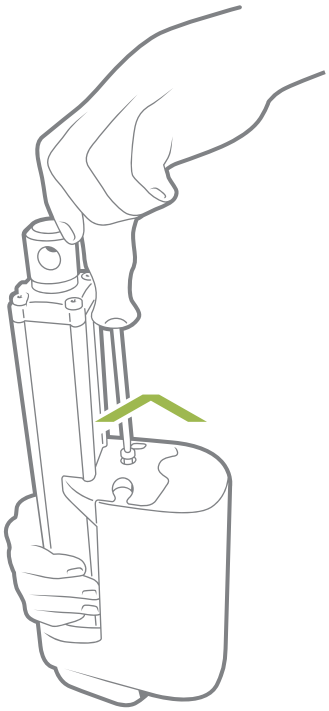
"90" Degrees

Off-highway housing

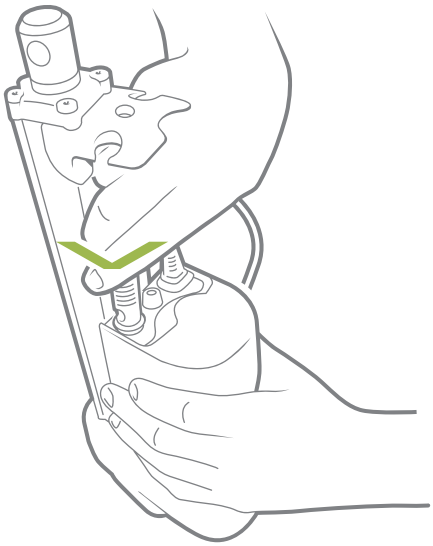
A reinforced vibration proof aluminium housing with a integrated 18-pin connector tested to even higher standards.

NB. All with tolerance of ±4°

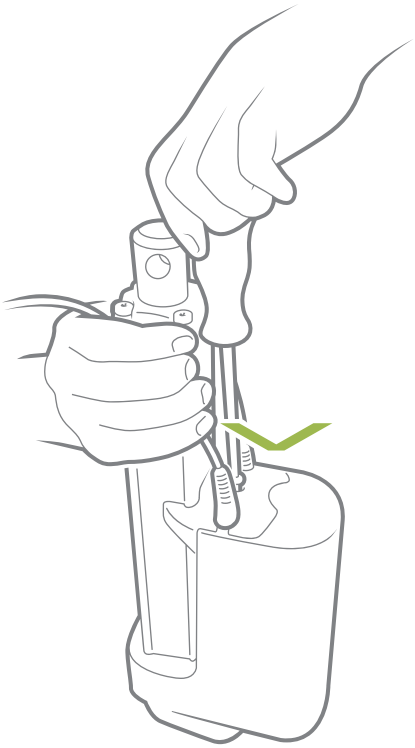
Cable mounting



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



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



3. Slide the cover onto the actuator.

   The torque of the cover screw is approx. 3.5 ± 0.3 Nm

   TORX 25IP

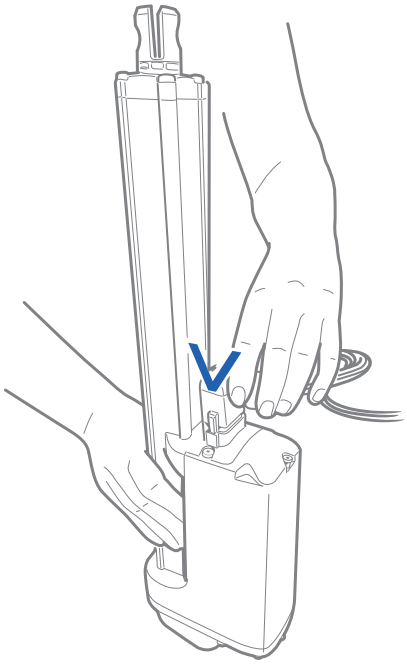
When changing the cables on a LINAK® actuator, it is important that this is done carefully, in order to protect the plugs and pins. Before the new cable is mounted, we recommend that the socket is greased with Vaseline®, to keep the high IP protection and ensure an easy mounting. Please be sure that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

Remove the tinned cable end when the cable end is mechanically connected. The tinned end is only to be used when a soldered connection is made.

Please note that if the cables are mounted and dismounted more than 3 times, the plugs can be damaged. Therefore, we recommend that such cables are discarded and replaced. Also note that the cables should not be used for carrying the actuator.

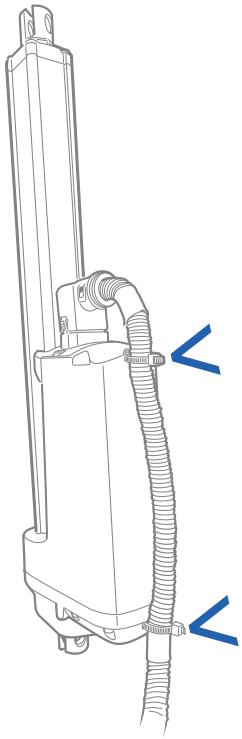
We recommend taking some precaution and designing the wire connection in such a way that the cable end is kept inside a closed, protected area to guarantee the high IP protection.

Mounting of cable Off-highway



1) Plug in the cable.

An audible “Click” confirms a correct mounting



2) Secure the cable with cable-ties to the two anchors

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

Cables

Power cable dimensions

LINAK® P/N 0367046

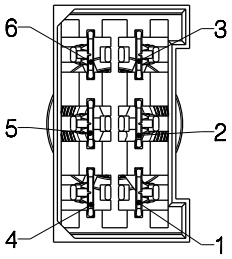
Colour	Outer dimensions	Core mm²	AWG
Brown	Ø2.8 mm	2.0	14
Blue	Ø2.8 mm	2.0	14

Ø 7.5 ± 0.15 mm

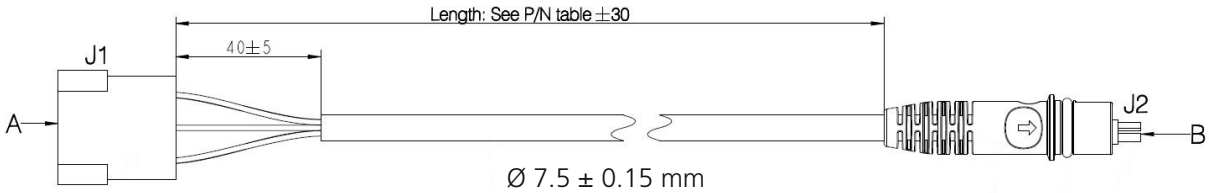
6-pin Signal cable dimensions

LINAK P/N 0367049

Colour	Outer dimensions	Core mm²	AWG
Violet	Ø1.5 mm	0.5	20
Black	Ø1.5 mm	0.5	20
Red	Ø1.5 mm	0.5	20
Yellow	Ø1.5 mm	0.5	20
Green	Ø1.5 mm	0.5	20
White	Ø1.5 mm	0.5	20



Rearview

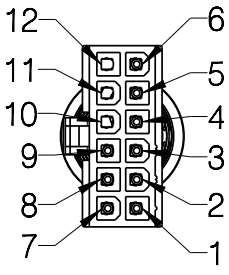


Ø 7.5 ± 0.15 mm

9-pin Signal cable dimensions

LINAK P/N 0368543

Colour	Outer dimensions	Core mm²	AWG	Pin
Orange	Ø1.5 mm	0.5	20	5
Black	Ø1.5 mm	0.5	20	1
Red	Ø1.5 mm	0.5	20	2
Light Blue	Ø1.5 mm	0.5	20	6
Yellow	Ø1.5 mm	0.5	20	3
Green	Ø1.5 mm	0.5	20	4
Grey	Ø1.5 mm	0.5	20	0
Violet	Ø1.5 mm	0.5	20	7
White	Ø1.5 mm	0.5	20	8



Frontview

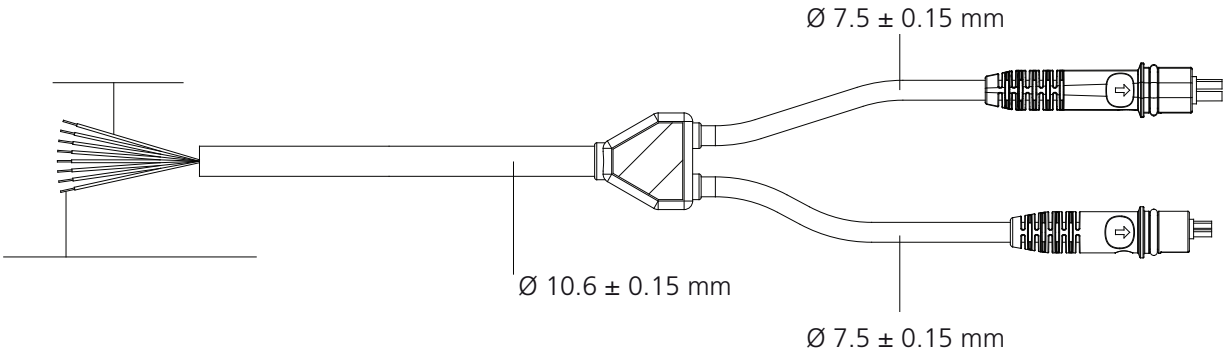
Cables

Y-cable dimensions

LINAK® P/N 0367020

Colour	Outer dimensions	Core mm²	AWG	Pin*
Brown	Ø2.8 mm	2.0	14	2
Blue	Ø2.8 mm	2.0	14	1
Red	Ø1.5 mm	0.5	20	4
Black	Ø1.5 mm	0.5	20	3
Yellow	Ø1.5 mm	0.5	20	7
Green	Ø1.5 mm	0.5	20	8
White	Ø1.5 mm	0.5	20	5
Violet	Ø1.5 mm	0.5	20	6

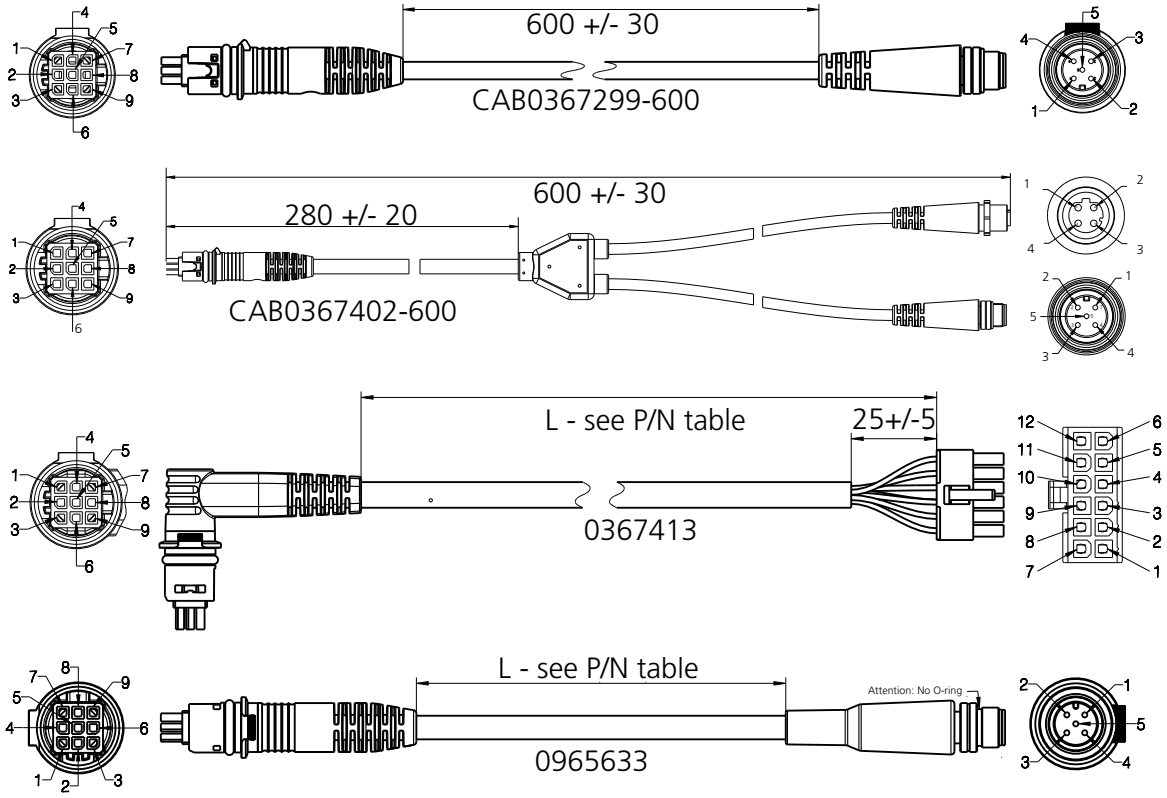
* Pin connections are the same for both AMP and Deutsch connectors



Cable P/N Table					
LINAK P/N	**Cable type**	**# Wires**	**mm²**	**AWG**	**Length in mm**
0367006	Power cable with AMP	2	2.0	14	200
CAB0367046-0400	Power cable	2	2.0	14	400
CAB0367046-0600	Power cable	2	2.0	14	600
CAB0367046-1500	Power cable	2	2.0	14	1,500
CAB0367046-5000	Power cable	2	2.0	14	5,000
CAB0367049-0600	Signal cable	6	0.5	20	600
CAB0367049-1500	Signal cable	6	0.5	20	1,500
CAB0367049-2000	Signal cable	6	0.5	20	2,000
CAB0367049-3000	Signal cable	6	0.5	20	3,000
CAB0367049-5000	Signal cable	6	0.5	20	5,000
CAB0368543-1500	Signal cable	9	0.5	20	1,500
CAB0368543-5000	Signal cable	9	0.5	20	5,000

*AWG: American Wire Gauge

Cable P/N Table						
LINAK P/N	**Cable type**		**# Wires**	**mm²**	**AWG**	**Length in mm**
CAB0367299-600	Signal cable for IO-Link		9	0.5	20	600
CAB0367402-600	Signal Y-cable for Ethernet/IP		9	0.5	20	600
0367413-600	Signal cable w. 90° plug		9	0.5	20	600
0965633-1000	Signal cable for Modbus		9	0.5	20	1000
CAB0367020-1500	Y-Cable	Signal Power	6 2	0.5 2.0	20 14	1,500
CAB0367020-5000	Y-Cable	Signal Power	6 2	0.5 2.0	20 14	5,000
0367430-XXXX	Y-Cable	Signal Power	9 2	0.5 2.0	20 14	1,500 5,000 10,000



Cable kit article numbers

BusLink cable kits					
Platform		**Article no.**	**Connection**	**Includes**	**Colour**
04	Modbus (IC)	1. 0964561-A 2. USB2LIN06-C	RJ45	1. Adapter 2. USB2LIN cable	Yellow
07 08	CAN SAE J1939 CANopen	0367997	RJ45	(Adapter + USB2Lin)	Green

Cable kit article numbers

Actuator Connect™ cable kits					
Platform		**Article no.**	**Pins**	**Includes**	**Colour**
B3 C3 F3 A7 A8 0B 14 A7 A8 4E 2E 0E	I/O Basic I/O Customised I/O Full CAN SAE J1939 CANopen IO-Link Modbus RTU CAN SAE J1939 CANopen Profinet Ethernet/IP Modbus TCP/IP	0367996	Signal-power + RJ45	(Adapter + USB2Lin)	Grey

Latest versions of both BusLink and Actuator Connect can be downloaded at the LINAK/TECHLINE page.

Off-highway connection to Actuator Connect™

When connecting the actuator to Actuator Connect™ it is imperative to follow these instructions.

Power supply connection:

The actuator has to be powered with 12 Volt DC

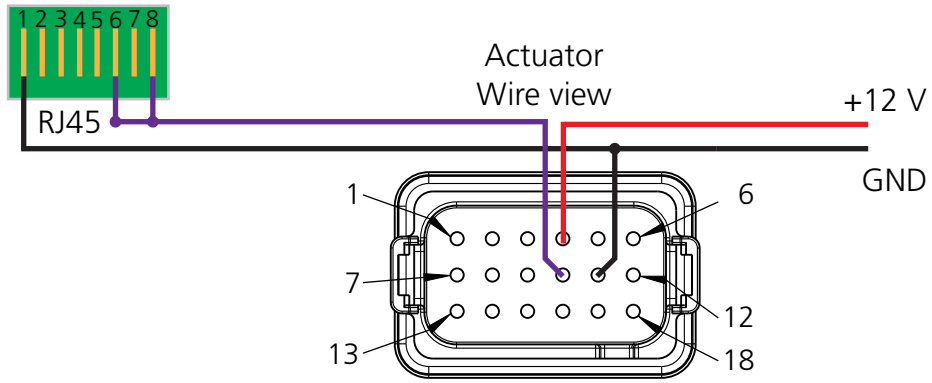
Positive is connected to pin 4 at the actuator

GND is connected to pin 11 at the actuator

RJ45:

Pin 1 at the RJ45 plug is Ground and has to be interconnected to GND on pin 11 at the actuator

Pin 6 and 8 at the RJ45 plug is communication and both has to be connected to pin 10 at the actuator:



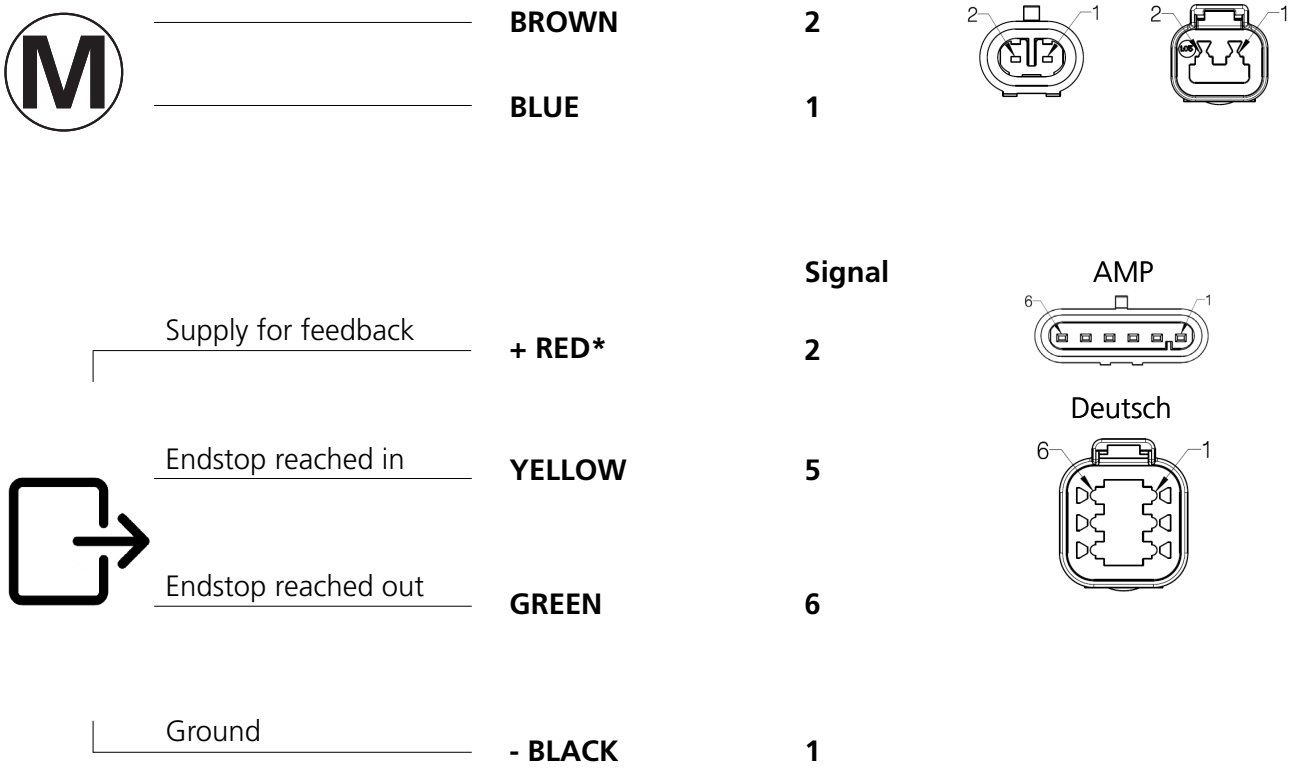
Electrical installation

- To ensure maximum self-locking ability, please make 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.
- When using actuators without integrated controller, it is strongly recommended to use a fuse between power supply and actuator.

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

Standard with endstop reached signal

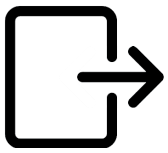
Platform: 01 (Ordering example value for place 11 and 12)
Feedback: 0 (Ordering example value for place 10)



If you wish to use the endstop signals, you will have to keep power on the Brown, Blue, Red and Black wires at all times when the actuator is running, and minimum one second before it starts to run, otherwise the signal will be lost.

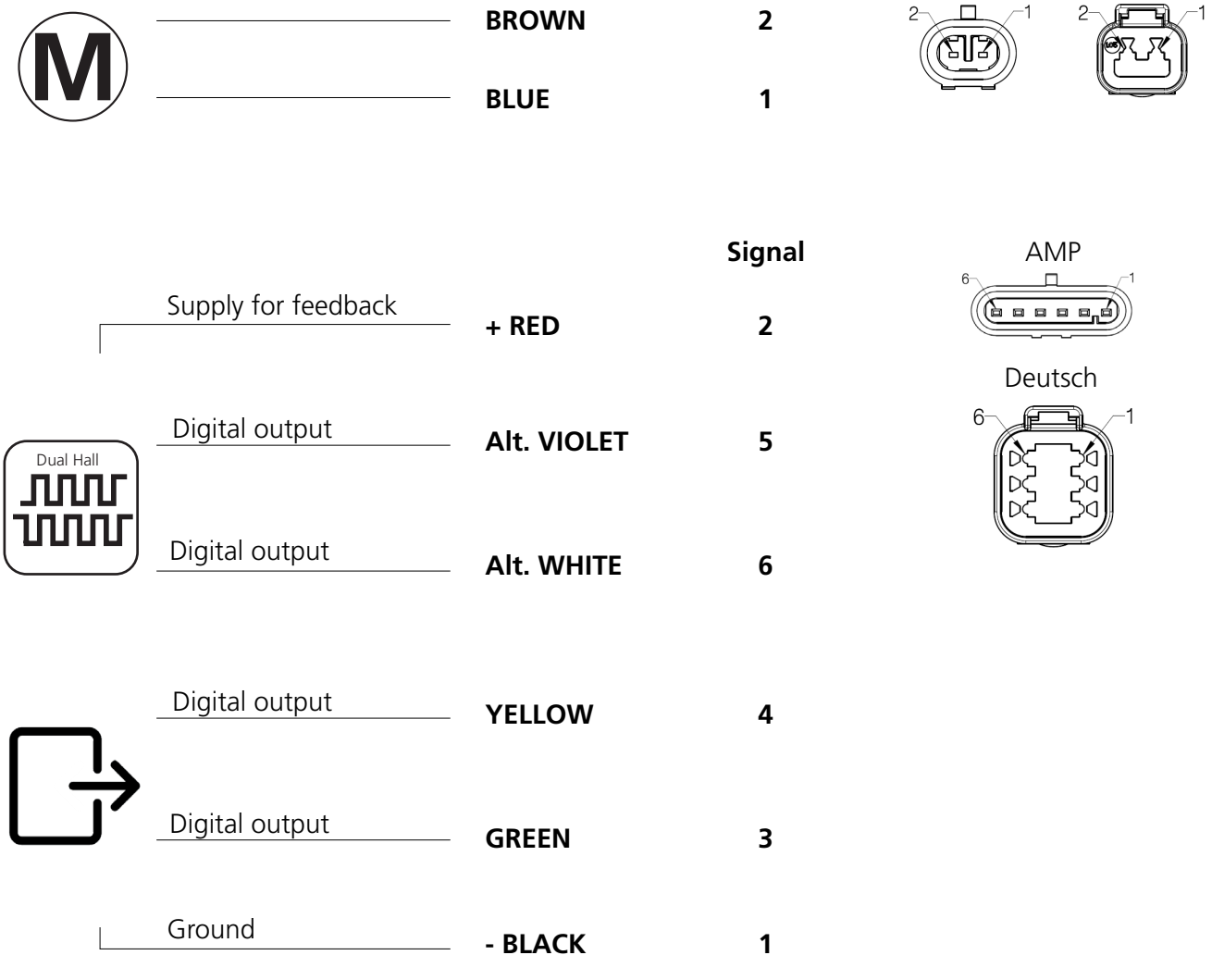
*Available only with Endstop Reached - Ordering Example value for place 12 will be: '1'

Standard with endstop reached signal

Input/Output	Specification	Comments
Description	The actuator can be equipped with electronically controlled Endstop reached out.	
Brown	12 V ± 20 % 24 V ± 10 % 48 V ± 10 %	To extend actuator: Connect Brown to positive Connect Blue to negative To retract actuator: Connect Brown to negative Connect Blue to positive
Blue		
Red	Signal power supply (+) 12 - 24 V DC	Current consumption: Max. 40 mA during run and pause Higher peak currents due to the input capacitance of max. 3 mF
Black	Signal power supply GND (-)	
Yellow	Endstop reached signal -running inwards	Output voltage min. V_{IN} (Red wire) - 2 V Source current max. 100 mA NOT potential free
Green	Endstop reached signal -running outwards	
Violet	Not to be connected	
White	Not to be connected	

Standard with Dual Hall - Relative positioning with endstop reached signal

Platform: 01 (Ordering example value for place 11 and 12)
Feedback: H (Ordering example value for place 10)



A Hall pulse consists of two Hall counts.
A Hall count occurs every time the signal changes direction, either upwards or downwards.

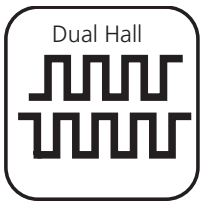
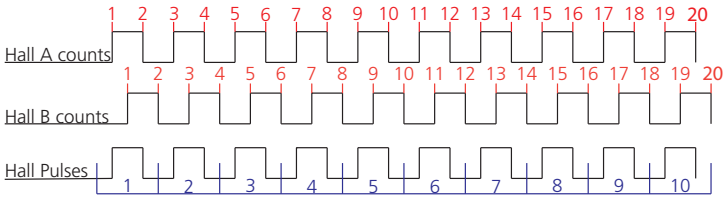
If you wish to use the endstop signals, you will have to keep power on the Brown, Blue, Red and Black wires at all times when the actuator is running, and minimum one second before it starts to run, otherwise the signal will be lost.

* If ordered with Endstop Reached this cord will be Violet

** If ordered with Endstop Reached this cord will be White

****Available only with Endstop Reached - Ordering Example value for place 12 will be: '1'

Standard with Dual Hall - Relative positioning with endstop reached signal

<table>
<tr><th>Input/Output</th><th colspan="2">Specification</th><th>Comments</th></tr>
<tr><td>Description</td><td colspan="2">The actuator can be equipped with Dual Hall that gives a relative positioning feedback signal when the actuator moves. The Dual Hall output is on two wires with a phase shift of 90° between the two quadrature signals.
Running outwards - pulse A will be first.
Running inwards - pulse B will be first.</td><td> 
</td></tr>
<tr><td>Brown</td><td colspan="2" rowspan="2">12 V ± 20 %
24 V ± 10 %
48 V ± 10 %</td><td rowspan="2">To extend actuator:
Connect Brown to positive
Connect Blue to negative
To retract actuator:
Connect Brown to negative
Connect Blue to positive</td></tr>
<tr><td>Blue</td></tr>
<tr><td>Red</td><td colspan="2">Signal power supply (+) 12 - 24 V DC</td><td rowspan="2">Current consumption:
Max. 40 mA during run and pause
Higher peak currents due to the input capacitance of max. 3 mF</td></tr>
<tr><td>Black</td><td colspan="2">Signal power supply GND (-)</td></tr>
<tr><td>Yellow (Violet)*</td><td>Hall A</td><td rowspan="2">For more info, see Technical Specifications</td><td rowspan="2">The Hall sensor signals are generated by the turning of the actuator gearing. These signals can be fed into a PLC (Programmable Logic Controller). In the PLC the quadrature signals can be used to register the direction and position of the piston rod.
Output voltage: min. V_{IN} (Red wire) - 2 V
Max. current output: 12 mA
Higher voltage on the motor can result in shorter pulses.</td></tr>
<tr><td>Green (White)**</td><td>Hall B</td></tr>
<tr><td>Yellow***</td><td colspan="2">Endstop reached signal -running inwards</td><td rowspan="2">Output voltage min. VIN - 2 V
Source current max. 30 mA
NOT potential free</td></tr>
<tr><td>Green***</td><td colspan="2">Endstop reached signal -running outwards</td></tr>
<tr><td colspan="4"> 

A Hall pulse consists of two Hall counts.
A Hall count occurs every time the signal changes direction, either upwards or downwards.</td></tr>
</table>

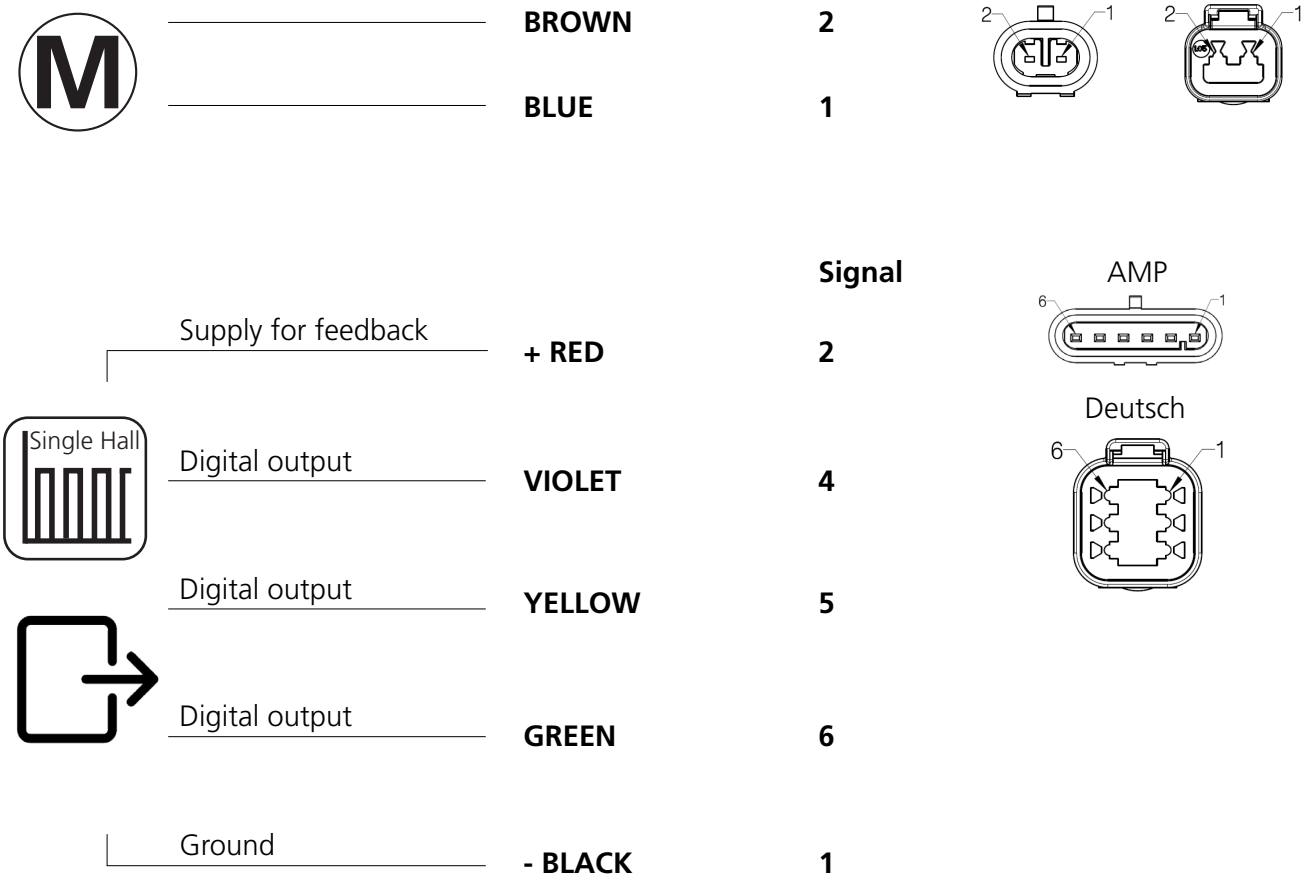
* If ordered with Endstop Reached this cord will be Violet

** If ordered with Endstop Reached this cord will be White

****Available only with Endstop Reached - Ordering Example value for place 12 will be: ‘1’

Standard with Single Hall - Relative positioning with endstop reached signal

Platform: 01 (Ordering example value for place 11 and 12)
Feedback: K (Ordering example value for place 10)

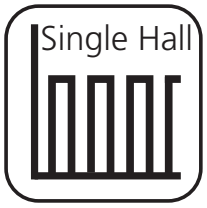
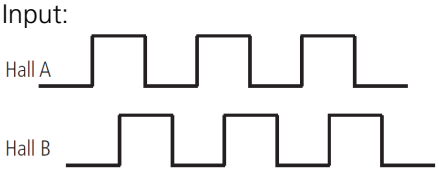
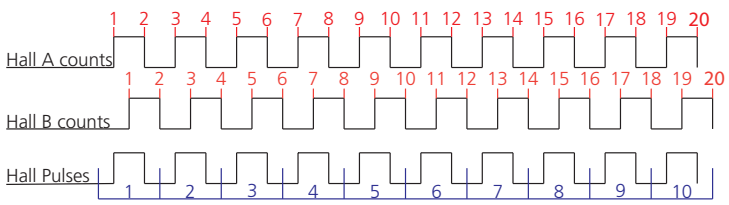


A Hall pulse consists of two Hall counts.
A Hall count occurs every time the signal changes direction, either upwards or downwards.

If you wish to use the endstop signals, you will have to keep power on the Brown, Blue, Red and Black wires at all times when the actuator is running, and minimum one second before it starts to run, otherwise the signal will be lost.

**Available only with Endstop Reached - Ordering Example value for place 12 will be: '1'

Standard with Single Hall - Relative positioning with endstop reached signal

<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 V ± 20 %
24 V ± 10 %
48 V ± 10 %</td><td rowspan="2">To extend actuator:
Connect Brown to positive
Connect Blue to negative
To retract actuator:
Connect Brown to negative
Connect Blue to positive</td></tr>
<tr><td>Blue</td></tr>
<tr><td>Red</td><td>Signal power supply (+) 12 - 24 V DC</td><td rowspan="2">Current consumption:
Max. 40 mA during run and pause
Higher peak currents due to the input capacitance of max. 3 mF</td></tr>
<tr><td>Black</td><td>Signal power supply GND (-)</td></tr>
<tr><td>Yellow</td><td colspan="2">Endstop reached signal -running inwards*</td></tr>
<tr><td>Green</td><td colspan="2">Endstop reached signal -running outwards*</td></tr>
<tr><td rowspan="3">Violet</td><td>For more info, see Technical Specifications</td><td rowspan="2">The Hall sensor signals are generated by the turning of the actuator gearing.
These signals can be fed into a PLC (Programmable Logic Controller).
In the PLC the quadrature signals can be used to register the direction and position of the piston rod.
Output voltage min. V_{IN} (Red wire) - 2 V
Max. source current: 30 mA
Max. current output: 12 mA
Max. 680 nF
Higher voltage on the motor can result in shorter pulses.</td></tr>
<tr><td>Higher voltage on the motor can result in shorter pulses.</td></tr>
<tr><td>Input:
 
</td><td>Single Hall output:
 
</td></tr>
<tr><td colspan="3"> 

A Hall pulse consists of two Hall counts.
A Hall count occurs every time the signal changes direction, either upwards or downwards.</td></tr>
</table>

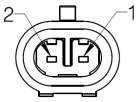
**Available only with Endstop Reached - Ordering Example value for place 12 will be: ‘1’

Standard with Analogue feedback - Absolute positioning with endstop reached signal

Platform: 01 (Ordering example value for place 11 and 12)
Feedback: A (Ordering example value for place 10)

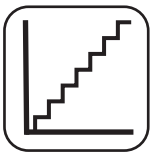
		Power
	BROWN	**2**
	BLUE	**1**

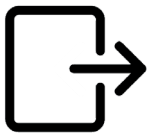
AMP



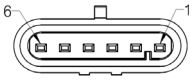
Deutsch

		Signal
Supply for feedback	**+ RED**	**2**
Analogue output	**VIOLET**	**4**
Digital output	**YELLOW**	**5**
Digital output	**GREEN**	**6**
Ground	**- BLACK**	**1**

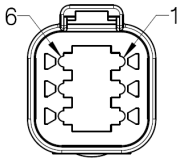




AMP



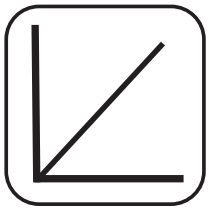
Deutsch



If you wish to use the endstop signals, you will have to keep power on the Brown, Blue, Red and Black wires at all times when the actuator is running, and minimum one second before it starts to run otherwise the signal will be lost.

*Available only with Endstop Reached - Ordering Example value for place 12 will be: '1'

Standard with Analogue feedback - Absolute positioning with endstop reached signal

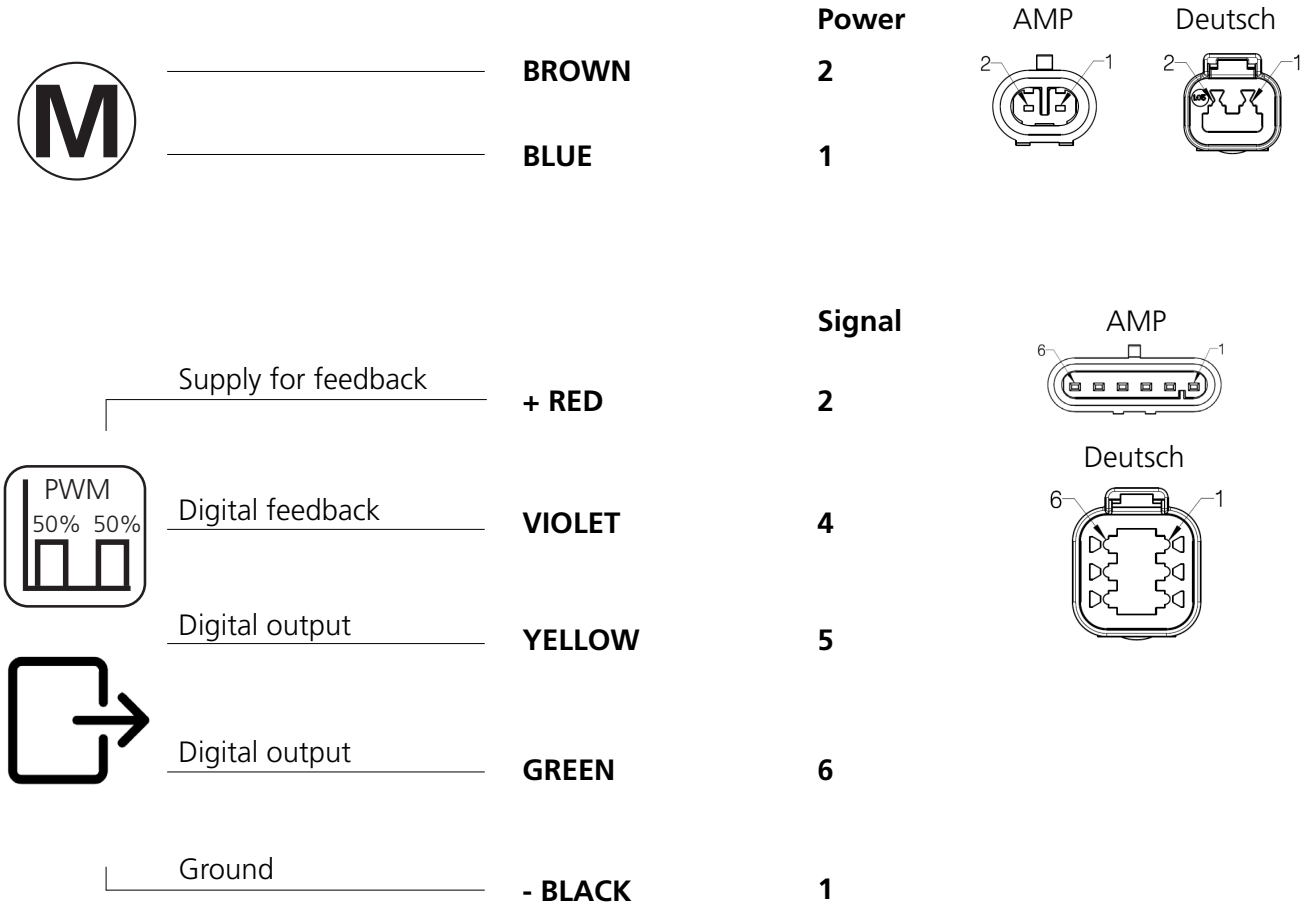
Input/Output	Specification	Comments
Description	The actuator can be equipped with an electronic circuit that gives an analogue feedback signal when the actuator moves.	
Brown	12 V ± 20 % 24 V ± 10 % 48 V ± 10 %	To extend actuator: Connect Brown to positive Connect Blue to negative To retract actuator: Connect Brown to negative Connect Blue to positive
Blue		
Red	Signal power supply (+) 12 - 24 V DC	Current consumption: Max. 60 mA during run and pause Higher peak currents due to the input capacitance of max. 3 mF
Black	Signal power supply GND (-)	
Yellow	Endstop reached signal -running inwards*	Output voltage min. V_{IN} (Red wire) - 2 V Max. source current: 100 mA NOT potential free
Green	Endstop reached signal -running outwards*	
Violet	Analogue feedback: 0 - 10 V 0.5 - 4.5 V	Tolerances: +/- 0.2 V Transaction delay: 20 ms Linear feedback: 0.5 % Max. current output: 1 mA
White	Not to be connected	

*Available only with Endstop Reached - Ordering Example value for place 12 will be: '1'

For actuators with analogue feedback it is recommended to fully extract and retract the actuator on a regular basis (thereby activating the limit switches) in order to ensure precise positioning.

Standard with PWM - Absolute positioning with endstop reached signal

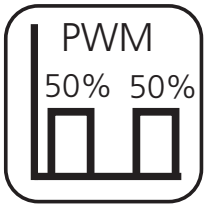
Platform: 01 (Ordering example value for place 11 and 12)
Feedback: F (Ordering example value for place 10)



If you wish to use the endstop signals, you will have to keep power on the Brown, Blue, Red and Black wires at all times when the actuator is running, and minimum one second before it starts to run, otherwise the signal will be lost.

*Available only with Endstop Reached - Ordering Example value for place 12 will be: '1'

Standard with PWM - Absolute positioning with endstop reached signal

Input/Output	Specification	Comments
Description	The actuator can be equipped with an electronic circuit that gives an analogue feedback signal when the actuator moves.	
Brown	12 V ± 20 % 24 V ± 10 % 48 V ± 10 %	To extend actuator: Connect Brown to positive Connect Blue to negative To retract actuator: Connect Brown to negative Connect Blue to positive
Blue		
Red	Signal power supply (+) 12 - 24 V DC	Current consumption: Max. 60 mA during run and pause Higher peak currents due to the input capacitance of max. 3 mF
Black	Signal power supply GND (-)	
Yellow	Endstop reached signal -running inwards*	Output voltage: min. V_{IN} (Red wire) - 2 V Source current: max. 100 mA NOT potential free
Green	Endstop reached signal -running outwards*	
Violet	Digital output feedback (PNP) 10 - 90% 20 - 80%	Output voltage: min. V_{IN} (Red wire) - 2 V Tolerances: +/- 2% Max. current output: 12 mA Frequency: 75 Hz
White	Not to be connected	

*Available only with Endstop Reached - Ordering Example value for place 12 will be: ‘1’

It is recommended to fully extract and retract the actuator on a regular basis (thereby activating the limit switches) in order to ensure precise positioning.

Manual hand crank

The manual hand crank can be used in the case of a power failure and is only intended for emergency use.

6 mm Allen key

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: Gear H = 4.0 mm

- The power supply has to be disconnected during manual operation.
- If the actuator is operated as a hand crank, it must only be operated by hand - otherwise there is a potential risk of overloading and thereby damaging the actuator. Do NOT use power tools to operate the hand crank!
- After using the hand crank, the ingress protection IP66 cannot be maintained.
- After using the hand crank, always return the actuator to the most inward position. Failing to do so can damage the actuator or the application it is used for.
- Actuators with absolute positioning must be initialised after use of the manual hand crank, because their positioning will be displaced when the power is disconnected.

Environmental tests - Climatic

Test	Specification	Comment
Cold test	EN60068-2-1 (Ab)	Storage at low temperature: Temperature: -40°C Duration: 72 h Not connected Tested at room temperature.
	EN60068-2-1 (Ad)	Storage at low temperature: Temperature: -30°C Duration: 2 h Actuator is not activated/connected Tested at low temperature.
Dry heat	EN60068-2-2 (Bb)	Storage at high temperature: Temperature: +90°C Duration: 72 h Actuator is not activated/connected Tested at room temperature.
	EN60068-2-2 (Bd)	Storage at high temperature: Temperature: +70°C Duration: 1000 h Actuator is not activated/connected Tested at high temperature. Operating at high temperature: Temperature: +60°C Int. max. 17% Duration: 700 h Actuator is activated Tested at high temperature.
Change of temperature	EN60068-2-14 (Na)	Rapid change of temperature: High temperature: +100°C in 60 minutes Low temperature: -30°C in 60 minutes Transition time: <10 seconds Duration: 100 cycles Actuator is not activated/connected Tested at room temperature.
	EN60068-2-14 (Nb)	Controlled change of temperature: Temperature change 5°C pr. minute High temperature: +70°C in 60 minutes Low temperature: -30°C in 30 minutes 130 minutes per cycle Duration: 1,000 cycles (90 days) Actuator is not activated/connected Tested at 250, 500 and 1000 cycles at low and high temperatures.

Environmental tests - Climatic

Damp heat	EN60068-2-30 (Db) EN60068-2-3 (Ca)	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 not activated/connected Tested within 1 hour after condensation, after upper temperature has been reached. Damp heat, steady state: Relative humidity: 93-95% Temperature: +40 ± 2°C Duration: 56 days Actuator is not activated/connected Tested within one hour after exposure.
Salt spray test		Actuators are tested for corrosion resistance at 500 hours salt spray test.
Degrees of protection IPX6 static		IPX6 static: Actuators are tested for water ingress according to IPX6, without movement. IPX4 dynamic: Actuators are tested in rainy conditions with movement. IP6X: Actuators are tested for dust sealing properties according to IP6X.
Chemicals	BS7691 / 96 hours	Diesel 100% Hydraulic oil 100% Ethylene Glucol 50% Urea Nitrogen saturated solution Liquid lime 10% (Super- Cal) NPK Fertilizer (NPK 16-4-12) saturated Tested for corrosion.
Climate test with Modbus PCB		Actuators with Modbus PCB are tested with 10.000 N load at temperatures of +5°C and +40°C.
Climate test with Hall PCB		Actuators with Hall PCB are tested with 15.000 N load at temperatures of -30°C and +70°C.

Environmental tests - Mechanical

Test	Specification	Comment
Free fall		Free fall from all sides: Height of fall: 0.4 meter onto steel. Actuator not activated/connected.
Vibration	EN60068-2-36 (Fdb) EN 60068-2-6 (Fc)	Random vibration: Short time test: 6.29 g RMS Actuator is not connected Long time test: 7.21 g RMS Actuator is not connected Duration: 2 hours in each direction Sinus vibration: Frequency 5-25Hz: Amplitude = 3.3 mm pp Frequency 25-200Hz: Acceleration 4 g Number of directions: 3 (X-Z-Y) Duration: 2 hours in each direction Actuator is not activated.
Bump	EN60068-2-29 (Eb)	Bump test: Level: 40 g Duration: 6 milliseconds Number of bumps: 500 shocks in each of 6 directions. Actuator is not connected.
Shock	EN60068-2-27 (Ea)	Shock test: Level: 100g Duration: 6 milliseconds Number of bumps: 3 shocks in each of 6 directions. Actuator is not connected.
Static load		Static push and pull tests of basic actuators with 500, 750 and 1000mm strokes.
Dynamic load		Dynamic push/pull tests of the actuator.
Self-locking test		Self-locking tests at dynamic and static load.
Abuse test		Tests at 100% duty cycle until damage.
Lifetime test		Lifetime tests performed at combined loads in push and pull situations.

Environmental tests - Electrical

Test	Specification	Comment
Power supply	ASAE EP455 (1990)	Operating voltages +10 V - +16 V Overvoltage +26 (V) / 5 min. Reverse polarity –26 (V) / 5 min. Short circuit to ground 16 (V) / 5 min. Short circuit to supply 16 (V) / 5 min.
HF-immunity	EN61000-6-2	Level: 30 V/m. at 26 MHz – 1000 mHz 80% 1 KHz
Emmision	EN61000-6-4	Level is inside limits for 12 V motor
Insulation test		Level: 500 VAC/25-100 hz for 1 minute
Automotive transients	ISO 7637	Load dump test only accepted on motor power connection.
Current and speed		Actuators with loads of 0 N, 7.500 N and 15.000 N are tested at -30°C, +20°C and 70°C

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

Environmental tests – Climatic - LA37 Off-highway

Test	Specification	Comment
Cold Test	EN60068-2-1 (Ab) EN60068-2-1 (Ad)	Storage at low temperature: Temperature: -55 °C Duration: 72 h Actuator is not activated/connected Tested at room temperature. Operating at low temperature: Temperature: -40 °C Duration: 16 h Actuator is not activated/connected. Tested at low temperature.
Dry Heat	EN60068-2-2 (Bb) EN60068-2-2 (Bd)	Storage at high temperature: Temperature: +105 °C Duration: 72 h Actuator is not activated/connected. Tested at room temperature Storage at high temperature: Temperature: +70 °C Duration: 1000 h Actuator is not activated/connected Tested at high temperature. Operating at high temperature: Temperature: +60 °C Int. max. 17 % Duration:700 h Actuator is activated Tested at high temperature.
Change of Temperature	EN60068-2-14 (Na) EN60068-2-14 (Nb)	Rapid change of temperature: High temperature: +105 °C in 60 minutes. Low temperature: -40 °C in 60 minutes. Transition time: <10 seconds Duration: 117 cycles Actuator is not activated/connected. Tested at room temperature. Controlled change of temperature: Temperature change 5 °C pr. minute High temperature: +70 °C in 60 minutes. Low temperature: -30 °C in 30 minutes. 130 minutes pr. Cycle. Duration: 1.000 cycles (90 days) Actuator is not activated/connected. Tested at 250, 500 and 1,000 cycles at low and high temperatures.

Test	Specification	Comment
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 not activated/connected. Tested within 1 hour after condensation, after upper temperature has been reached.
	EN60068-2-3 (Ca)	Damp heat, Steady state: Relative humidity: 93-95 % Temperature: +40 ± 2 °C Duration: 56 days Actuator is not activated/connected. Tested within one hour after exposure.
	EN600068-2-78	Temp 40 °C Relative Humidity 95% Test Duration 168 Hours Actuator is not activated/connected. DUT orientation: Normal operating orientation
Salt Mist	ISO-9227	Continously salt spray test: Salt solution: 5 % sodium chloride (NaCl) Actuator activated/connected. Exposure time: 500 hours
Degrees of Protection	EN60529 – IP54	IP5X - Dust: Dust-tight, No ingress of dust. Actuator is not connected IPX4 – Water: Ingress of water in quantities causing harmful effects is not allowed. Duration: 100 litres pr. minute in 3 minutes Actuator is not connected
	EN60529 – IP66	IPX6 –Connected actuator: Actuator is driving out and in for 3 min. 100 (l/min) jet of water is placed at the wiper ring for 3 (min). IPX6 –Connected actuator and push 6800 (N) Actuator is preheated to 85 °C driving out and in for 3 min. and Push 6800 (N) at the end-pos. 100 (l/min.) jet of water (15 °C) is placed at the wiper ring for 3 min.
	ISO-20653 – IP6KX	Category : 1 (air pressure reduction) Dust medium : Talcum Air pressure : 2 kPa (20 mbar) below normal air pressure Duration : 8 hours.
	ISO-20653 – IPX9K	High pressure cleaner: Water temperature: +90 °C Water pressure: 350 bar Flowrate: 15L/min Spray angle: 360 ° Spray distance: 200 mm Duration: From any direction continously in 300 seconds Actuator is connected. Ingress of water in quantities causing harmful effects is not allowed.

Test	Specification	Comment		
	ISO 16750	The actuator has been warmed up to 85 °C for 8 hours. After this it is cooled down in 00 °C salt water. Cooling time: 120 minutes Repeated 5 times and weight recorded after each cycle. Opened for check of residue of salt deposit and water. No weightgain, water or salt residue allowed.		
Chemical test	Chemicals:	Explanation regarding chemical (poss. incl. source of supply and/or trade name):	Test temp °C:	Test duration:
	Diesel fuel	EN 590	85	22 h
	'Bio' diesel fuel	EN 14214	85	22 h
	Engine oil	Multigrade oil SAE OW40, API SL / C	85	22 h
	Transmission fluid	ATF Dexron III'	85	22 h
	Hydraulic fluid	DIN 51 524-3 (HVLP ISO VG 46)	85	22 h
	Grease	DIN 51 502 (KP2K-30)	85	22 h
	Anti-freeze 50 % (1:1)	Ethylene glycol (C2H602) - Water mixture	85	22 h
	Urea Nitrogen saturated solution	ISO 22241-1; Urea NOx "ad blue" e.g. P3 Solvclean AK (manufactured by Henkel)	85	22 h
	Cold cleaner	E.g. P3 Solvclean AK (by Henkel)	RT	22 h
	Contact spary	E.g. WD 40	85	22 h
	Ammonium hydroxide	20% diluted water-based solution	RT	22 h
	Liquid lime 10 % (Super- Cal)	Lime fertiliser, 10% solution; can be obtained from seed and fertiliser traders	RT	22 h
	NPK Fertilizer (NPK 16-4-12) saturated	Nitrogen (5-9%), phosphorus (5-9%)potassium (5-9%) portions can be obtained from seed and fertiliser traders e.g. COMPO 14361/14354, PhytoGreen NPK 8-8-6 or similar.	RT	22 h

Environmental tests - Mechanical - LA37 Off-highway

Test	Specification	Comment
Free Fall	60068-2-31	Free fall from all sides: Height of fall: 0.45 meter onto concrete Actuator not activated/connected.
Vibration	EN60068-2-64	Random vibration: Test: 5.9 g RMS 10-2,000 Hz Actuator is connected for monitoring during the test Duration: 32 hours in each direction (x,y and z).
Shock	EN60068-2-27 (Ea)	Shock test: Level: 51 g Duration: 6 milliseconds Number of bumps: 10 shocks in each of 6 directions. Actuator is connected for monitoring during the test

Contacts

FACTORIES

Denmark - Headquarters
LINAK A/S
Phone: +45 73 15 15 15
Fax: +45 74 45 80 48
Fax (Sales): +45 73 15 16 13
Web: www.linak.com

China
LINAK (Shenzhen) Actuator Systems, Ltd.
Phone: +86 755 8610 6656
Phone: +86 755 8610 6990
Web: www.linak.cn

Slovakia
LINAK Slovakia s.r.o.
Phone: +421 51 7563 444
Web: www.linak.sk

Thailand
LINAK APAC Ltd.
Phone: +66 33 265 400
Web: www.linak.com

USA
LINAK U.S. Inc.
Americas Headquarters
Phone: +1 502 253 5595
Fax: +1 502 253 5596
Web: www.linak-us.com
www.linak-latinamerica.com

SUBSIDIARIES

Australia
LINAK Australia Pty. Ltd
Phone: +61 3 8796 9777
Fax: +61 3 8796 9778
E-mail: sales@linak.com.au
Web: www.linak.com.au

Austria
LINAK Zweigniederlassung - Österreich (Wien)
Phone: +43 (1) 890 7446
Fax: +43 (1) 890 744615
E-mail: info@linak.de
Web: www.linak.at - www.linak.hu

Belgium
LINAK Actuator-Systems NV/SA
(Belgium & Luxembourg)
Phone: +32 (0)9 230 01 09
E-mail: beinfo@linak.be
Web: www.linak.be - www.fr.linak.be

Brazil
LINAK Do Brasil Comércio De Atuadores Ltda.
Phone: +55 (11) 2832 7070
Fax: +55 (11) 2832 7060
E-mail: info@linak.com.br
Web: www.linak.com.br

Canada
LINAK Canada Inc.
Phone: +1 502 253 5595
Fax: +1 416 255 7720
E-mail: info@linak.ca
Web: www.linak-us.com

Czech Republic
LINAK C&S s.r.o.
Phone: +42 058 174 1814
Fax: +42 058 170 2452
E-mail: info@linak.cz
Web: www.linak.cz - www.linak.sk

Denmark - International
LINAK International
Phone: +45 73 15 15 15
E-mail: info@linak.com
Web: www.linak.com

Denmark - Sales
LINAK Danmark A/S
Phone: +45 86 80 36 11
Fax: +45 86 82 90 51
E-mail: linak@linak-silkeborg.dk
Web: www.linak.dk

Finland
LINAK OY
Phone: +358 10 841 8700
E-mail: linak@linak.fi
Web: www.linak.fi

France
LINAK France E.U.R.L
Phone: +33 (0) 2 41 36 34 34
Fax: +33 (0) 2 41 36 35 00
E-mail: linak@linak.fr
Web: www.linak.fr

Germany
LINAK GmbH
Phone: +49 6043 9655 0
Fax: +49 6043 9655 60
E-mail: info@linak.de
Web: www.linak.de

India
LINAK A/S India Liaison Office
Phone: +91 120 4531797
Fax: +91 120 4786428
E-mail: info@linak.in
Web: www.linak.in

Ireland
LINAK UK Limited (Ireland)
Phone: +44 (0)121 544 2211
Fax: +44 (0)121 544 2552
+44 (0)796 855 1606 (UK Mobile)
+35 387 634 6554 (Rep.of Ireland Mobile)
E-mail: sales@linak.co.uk
Web: www.linak.co.uk

Italy
LINAK ITALIA S.r.l.
Phone: +39 02 48 46 33 66
Fax: +39 02 48 46 82 52
E-mail: info@linak.it
Web: www.linak.it

Japan
LINAK K.K.
Phone: 81-45-533-0802
Fax: 81-45-533-0803
E-mail: linak@linak.jp
Web: www.linak.jp

Malaysia
LINAK Actuators Sdn. Bhd.
Phone: +60 4 210 6500
Fax: +60 4 226 8901
E-mail: info@linak-asia.com
Web: www.linak.my

Netherlands
LINAK Actuator-Systems B.V.
Phone: +31 76 5 42 44 40 /
+31 76 200 11 10
E-mail: info@linak.nl
Web: www.linak.nl

New Zealand
LINAK New Zealand Ltd
Phone: +64 9580 2071
Fax: +64 9580 2072
E-mail: nzsales@linak.com.au
Web: www.linak.com.au

Norway
LINAK Norge AS
Phone: +47 32 82 90 90
E-mail: info@linak.no
Web: www.linak.no

Poland
LINAK Polska
LINAK Danmark A/S (Spólka Akcyjna)
Phone: +48 22 295 09 70 /
+48 22 295 09 71
E-mail: info@linak.pl
Web: www.linak.pl

Republic of Korea
LINAK Korea Ltd.
Phone: +82 2 6231 1515
Fax: +82 2 6231 1516
E-mail: info@linak.kr
Web: www.linak.kr

Slovakia
LINAK Slovakia S.R.O.
Phone: +421 51 7563 444
Web: www.linak.sk

Spain
LINAK Actuadores, S.L.u
Phone: +34 93 588 27 77
Fax: +34 93 588 27 85
E-mail: esma@linak.es
Web: www.linak.es

Sweden
LINAK Scandinavia AB
Phone: +46 8 732 20 00
Fax: +46 8 732 20 50
E-mail: info@linak.se
Web: www.linak.se

Switzerland
LINAK AG
Phone: +41 43 388 31 88
Fax: +41 43 388 31 87
E-mail: info@linak.ch
Web: www.linak.ch - www.fr.linak.ch
www.it.linak.ch

Taiwan
LINAK (Shenzhen) Actuator systems Ltd.
Taiwan Representative office
Phone: +886 2 272 90068
Fax: +886 2 272 90096
E-mail: sales@linak.com.tw
Web: www.linak.com.tw

Turkey
LINAK İth. İhr. San. ve Tic. A.Ş.
Phone: + 90 312 4726338
Fax: + 90 312 4726635
E-mail: info@linak.com.tr
Web: www.linak.com.tr

United Kingdom
LINAK UK Limited
Phone: +44 (0)121 544 2211
Fax: +44 (0)121 544 2552
E-mail: sales@linak.co.uk
Web: www.linak.co.uk

DISTRIBUTORS

Argentina
Novotec Argentina SRL
Phone: 011-4303-8989 / 8900
Fax: 011-4032-0184
E-mail: info@novotecargentina.com
Web: www.novotecargentina.com

Colombia
MEM Ltda
Phone: +[57] (1) 334-7666
Fax: +[57] (1) 282-1684
E-mail: servicioalcliente@memltda.com.co
Web: www.mem.net.co

India
Mechatronics Control Equipments India Pvt Ltd
Phone: +91-44-28558484, 85
E-mail: bala@mechatronicscontrol.com
Web: www.mechatronicscontrol.com

Indonesia
PT. Himalaya Everest Jaya
Phone: +6 221 544 8956 /+6 221 544 8965
Fax: +6 221 619 1925
Fax (Sales): +6 221 619 4658
E-mail: hejplastic-div@centrin.net.id
Web: www.hej.co.id

Israel
NetivTech LTD
Phone: +972 55-2266-535
Fax: +972 2-9900-560
Email: info@NetivTech.com
Web: www.netivtech.com

Singapore
Servo Dynamics Pte Ltd
Phone: +65 6844 0288
Fax: +65 6844 0070
E-mail: servodynamics@servo.com.sg

South Africa
Industrial Specialised Applications CC
Phone: +27 011 466 0346
E-mail: gartht@isagroup.co.za
Web: www.isaza.co.za

United Arab Emirates
Mechatronics
Phone: +971 4 267 4311
Fax: +971 4 267 4312
E-mail: mechtron@emirates.net.ae

LINAK®
WE IMPROVE YOUR LIFE