HIWIN® MIKROSYSTEM

Linear Actuator

User Manual

www.hiwinmikro.tw
MA99UE18-2310_V1.2

Related Documents

Through related documents, users can quickly understand the positioning of this manual and the correlation between manuals and products. Go to HIWIN MIKROSYSTEM's official website → Download → Manual Overview for details (https://www.hiwinmikro.tw/Downloads/ManualOverview_EN.htm).

Approvals

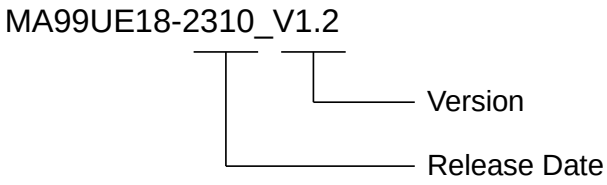
Linear Actuator		
CE requirement 	EMC requirement	EN55011 EN55014-1 EN55014-2 EN60601-1-2 EN61000-3-2 EN61000-3-3 EN61000-6-2
	Safety requirement	EN60335-1 EN60601-1 EN60601-2-38 EN1970 IEC60601-2-52
UL requirement		UL60601-1 UL1004 CSA22.2

Table of Contents

1. General information

1.1 Revision history

The version of the manual is also indicated on the bottom of the front cover.



Release Date	Version	Applicable Product	Revision Contents
Oct. 13th, 2023	1.2	Linear actuator	Update section 11.6 **Customer request form**: Change aerospace to aviation.
Apr. 21st, 2023	1.1	Linear actuator	Rearrange the chapters.
Jul. 19th, 2018	1.0	Linear actuator	First edition.

1.2 About this manual

This manual explains the features of the product, possibilities for use, operating conditions and operation limits of linear actuator.

This manual is only intended for the use of trained specialists in automation and control engineering who are familiar with the applicable national standards. It is the duty of the technical personnel to use the manual published at the respective time of each installation and commissioning.

The responsible staff must ensure the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations guidelines and standards.

Be sure to refer to this manual and to keep this manual in a location where it can be accessed at any time.

- Documents
  The required catalog or manual can be obtained through the following website.
  https://www.hiwinmikro.tw/en/product/linear-actuator

1.3 General precautions

Before using the product, please carefully read through this manual. HIWIN MIKROSYSTEM is not responsible for any damage, accident or injury caused by failure in following the installation instructions and operating instructions stated in this manual.

- Before installing or using the product, check the package to see if it has been damaged or broken. If there is any damage, please contact the sales representatives of HIWIN MIKROSYSTEM or agents or dealers.
- Read the performance specifications indicated on the label or in the enclosed document before installation. Install the product based on the limit of the performance with installation guide.
- Before using the product, read the power supply indicated on the specification label and ensure the power supply meets the requirement. HIWIN MIKROSYSTEM is not responsible for any product damage or personal injury caused by wrong power supply.
- Check if the cables have been damaged and if they can be used for connection.
- Do not pull the power cable with excessive force when moving the product.
- Do not use the product in the environment that exceeds its rated load. HIWIN MIKROSYSTEM is not responsible for any product damage or personal injury caused by this.
- Do not use the product in the environment with impact. HIWIN MIKROSYSTEM is not responsible for any product damage or personal injury caused by this.
- Do not disassemble or modify the product by yourselves. The product has been designed with structural calculations, computer simulations and physical testing. Do not disassemble or modify the product without the permission of professionals.
- Do not repair the product by yourselves if something abnormal occurs. The product can only be repaired by HIWIN MIKROSYSTEM qualified technicians.
- Children are not allowed to operate this product.
- People who have physical or mental disease or who do not have experience with the use of related products are not allowed to use this product unless they are accompanied by supervisors or personnel familiar with the product to ensure their safety.
- If the information of registration does not match your purchasing or if there are any questions related to the product, please contact the sales representatives of HIWIN MIKROSYSTEM or agents or dealers.

HIWIN MIKROSYSTEM offers 1-year warranty for the product. The warranty does not cover damage caused by improper usage (refer to the precautions and instructions stated in this manual) or natural disaster.

- Protective requirement

Table 1.3.1

Operating Phase	Personal Protective Equipment
Normal Operation	In the vicinity of linear actuator systems, the following personal protective equipment is required: ✓ Safety shoes ✓ Protective helmet ✓ Protective gloves
Cleaning	When cleaning linear actuator systems, the following personal protective equipment is required: ✓ Safety shoes ✓ Protective helmet ✓ Protective gloves ✓ Protective goggles
Maintenance	When carrying out maintenance and repairs, the following personal protective equipment is required: ✓ Safety shoes ✓ Protective helmet ✓ Protective gloves

■ Installation precautions

⚠WARNING

Risk of personal injury or damage to property.

- ◆ Follow the technical instruction and install the linear actuator at a location with bearable load.
- ◆ When installing, do not impact or strike the linear actuator.
- ◆ When installing, prevent foreign objects from entering the product.
- ◆ The spacing for installing the linear actuator, controller, keypad and other machines should follow specifications.
- ◆ When installing, please set up an external emergency stop loop that can immediately stop the product and cut off power.

■ Wiring precautions

⚠WARNING

Risk of personal injury or damage to property.

- ◆ Ensure wiring is correctly performed. Otherwise, it may lead to product malfunction or burn-out. There could be a risk of injury or fire.
- ◆ Before using the product, carefully read through the specification noted on product label, and ensure the product is used with power supply specified in product requirement.
- ◆ Check if the wiring is correct. Incorrect wiring may make the linear actuator operate abnormally, or even cause permanent damage to the linear actuator.

■ Operation precautions

⚠WARNING

Risk of personal injury or damage to property.

- ◆ Please follow the requirements of operating instruction.
- ◆ Ensure there is no object in the motion range of the system.
- ◆ Do not operate the product in the environment that exceeds its rated load.
- ◆ If any abnormal odor, noise, smoke, temperature rise or vibration is detected, stop the linear actuator and turn off the power immediately.

■ Storage precautions

⚠CAUTION

Risk of damage to property.

Follow the precautions of linear actuator storage conditions.

- ◆ Do not store the product in an inflammable environment or with chemical agents.
- ◆ Do not store the product in a place with humidity, dust, harmful gases or liquids.
- ◆ Clean and protect used linear actuator before storage.
- ◆ Storage conditions must comply with EN 60721-3-1 (refer to the table below for storage conditions).
- ◆ Linear actuator can be stored indoors for up to two years with the following conditions:
  - (1) Dry
  - (2) Dust-free
  - (3) No vibration
  - (4) Good ventilation
  - (5) Resistance to extreme weather
  - (6) Indoor air does not contain corrosive gases
  - (7) Prevent linear actuator from vibration and moisture
- ◆ If no dry storage environment is available, the following measures need to be taken:
  - (1) Wrap the linear actuator with moisture-absorbing material, and then seal the linear actuator.
  - (2) Put desiccant in the sealed package; the desiccant needs to be checked and replaced if necessary.
- ◆ Check the linear actuator regularly.

Storage conditions are listed as follows:

Table 1.3.2

Environmental Parameter	Description
Air temperature	-10°C~50°C
Relative humidity	20~80%
Rate of change of temperature	0.5 °C/min
Condensation	Not allowed
Formation of ice	Not allowed
Store the linear actuator in an environment with good protection. (indoor / factory)	

■ Transportation precautions

⚠CAUTION

Risk of personal injury or damage to property.

Follow the precautions of linear actuator transport conditions.

- ◆ Carefully move the products to avoid damage.
- ◆ Do not apply excessive force to the product.
- ◆ Do not stack the products to avoid collapse.
- ◆ Transport conditions must comply with EN 60721-3-1 (refer to the table below for transportation conditions).

Transportation conditions are listed as follows:

Table 1.3.3

Environmental Parameter	Description
Air temperature	-10°C~50°C
Relative humidity	20~80%
Rate of change of temperature	0.5 °C/min
Condensation	Not allowed
Formation of ice	Not allowed
Delivery the linear actuator in an environment with good protection. (indoor / factory)	

■ Maintenance precautions

⚠WARNING

Risk of personal injury or damage to property.

- ◆ Do not disassemble or modify the product.
- ◆ If the product malfunctions, do not repair the product by yourselves, please contact HIWIN MIKROSYSTEM for repairs.

■ Disposal precautions

⚠WARNING

Risk of personal injury or damage to property.

- ◆ If it is not correctly performed, it may cause personal injury or damage to material.
- ◆ Please ensure that the linear actuator and related components are disposed of correctly.

1.4 Safety instruction

- Carefully read through this manual before installation, transportation, maintenance and examination. Ensure the product is correctly used.
- Carefully read through electromagnetic (EM) information, safety information and related precautions before using the product.
- Safety precautions in this manual are classified into “DANGER”, “WARNING” and “CAUTION”.

⚠DANGER

Imminent danger!

Indicates that death or severe personal injury will result if proper precautions are not taken.

⚠WARNING

Potentially dangerous situation!

Indicates that death or severe personal injury may result if proper precautions are not taken.

⚠CAUTION

Potentially dangerous situation!

Indicates that property damage or environmental pollution can result if proper precautions are not taken.

Warning Signs			
	No access for people with active implanted cardiac devices.		Substance hazardous to the environment!
	Warning!		Warning of crushing of hands!
	Warning of electricity!		Warning of hot surface!

Mandatory Signs			
	Wear head protection!		Refer to user manual!
	Wear protective gloves!		Disconnect before carrying out maintenance or repair.
	Wear safety footwear!		Lifting point.

- When using linear actuator, do not cause mechanical interference to avoid failures in motor or mechanical structure.
- If customers use their own power supplies and controllers, according to the current allowed by the cross-section of the cable, install overcurrent protection device (such as fuse) and overcurrent detection device on the output side of power supply or the input side of linear actuator's power cable. Then, use this overheat detection signal to stop linear actuator or disconnect power supply to ensure the power can be cut off when the extrusion tube is at the limit position or under overload operation for appropriate control and protection.
- Except for special orders, the rated duty cycle of HIWIN MIKROSYSTEM linear actuator is 10%, which is defined as 2 minutes of continuous operation and 18 minutes of rest. If the usage exceeds the rated duty cycle (10%), install overheat detection and prevention devices (such as fan) and use this overheat detection signal to stop linear actuator or disconnect power supply according to control requirements.
- If customers do not purchase limit switches, install the limit switches at the positions of upper and lower limit of stroke for the extrusion tube themselves. Besides, use the controllers and power suppliers that can use the limit switches as power-off protection measure to ensure the power can be cut off when the extrusion tube moves to the stroke limit position.
- The linear actuator is DC driven. When the two power input cables of motor are exchanged, the extrusion tube of linear actuator will move reversely. When it stops, use proper controllers and power suppliers and make the two power input cables of motor short-circuited to provide auxiliary brake. Note that the power of motor should be disconnected and then short-circuited to avoid short circuit on power supplier.
- Do not operate the linear actuator up to the stroke limit if there are no limit switches and controllers have no overload protection.
- If the linear actuator is not waterproof, follow the waterproof regulations.
- Operating temperature: 5°C~40°C (41°F~104°F)

- The protection class of anti-shock is BF and B.
- Disposal of the damaged product: Recycle by local regulations.
- The product should be installed in a safe place where is allowed to take off the plug easily in an emergency situation.
- If linear actuator has assembled with medical bed, the overall cleaning procedure must be performed according to the waterproof level (IP class) of linear actuator.
- If customers need to adjust the positions of external limit themselves, make marks on the original positions of upper and lower limit (e.g., line drawing, sticker gluing) to prevent damage to linear actuator.
- For the specification of external limit, refer to the approved drawing and user manual.

⚠DANGER

Danger from operation!

- Do not repair the product by yourselves if something abnormal occurs. The product can only be repaired by HIWIN MIKROSYSTEM qualified technicians or sent back to HIWIN MIKROSYSTEM for repairs.
- Do not apply the load exceeding the specification standards to the product.
- Do not change product parts or remove product screws without authorization, or the product will be damaged. HIWIN MIKROSYSTEM is not responsible for any damage, accident or injury caused by this.

⚠DANGER

Danger from electrocution!

- To prevent risk of electric shock, do not use damaged cables with excessive pressure or press and clamp the wire overly.
- Do not remove the cover, cables, or connector from the linear actuator while the power is ON.
- Do not touch wires or operate the equipment with wet hands.
- Do not use when wires are in contact with oil or water.

⚠WARNING

- Read this manual and follow it carefully before using the product.
- Do not modify the product without the authorization of manufacturer.
- Remove the power cable when the product is being moved to avoid damage to power cable.
- Do not use the product in the presence of flammable anesthetics or other flammable substances in combination with air, oxygen-enriched environment, or nitrous oxide.
- Turn off the power before cleaning the product.
- Always ensure that the supply voltage meets the factory set voltage and frequency range, as provided on the product.
- The latest version of the user manual can be obtained from HIWIN MIKROSYSTEM official website. The manual is subject to change without prior notice.

1.5 Copyright

Note:
HIWIN MIKROSYSTEM reserves the right to change the contents of this manual or product specifications without prior notice.

1.6 Manufacturer information

Table 1.6.1 Manufacturer's details

Corp.	HIWIN MIKROSYSTEM CORP.
Address	No.6, Jingke Central Rd., Taichung Precision Machinery Park, Taichung 40852, Taiwan
Tel.	+886-4-23550110
Fax	+886-4-23550123
Sales E-mail	business@hiwinmikro.tw
Customer Service E-mail	service@hiwinmikro.tw
Website	http://www.hiwinmikro.tw

1.7 Product monitoring

Please inform HIWIN MIKROSYSTEM, the manufacturer of linear actuator systems, of:

- Accidents
- Potential sources of danger in linear actuator systems
- Anything in this user manual which is difficult to understand

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2. Basic safety information

2.1 Overview

This chapter explains safety notices and risk management approach of using the product.

2.2 Basic safety notices

DANGER

Danger from operation!

- Do not repair the product by yourselves if something abnormal occurs. The product can only be repaired by HIWIN MIKROSYSTEM qualified technicians or sent back to HIWIN MIKROSYSTEM for repairs.
- Do not apply the load exceeding the specification standards to the product.
- Do not change product parts or remove product screws without authorization, or the product will be damaged. HIWIN MIKROSYSTEM is not responsible for any damage, accident or injury caused by this.

DANGER

Danger from electrocution!

- To prevent risk of electric shock, do not use damaged cables with excessive pressure or press and clamp the wire overly.
- Do not remove the cover, cables, or connector from the linear actuator while the power is ON.
- Do not touch wires or operate the equipment with wet hands.
- Do not use when wires are in contact with oil or water.

WARNING

Risk of personal injury or damage to property.

- Follow the technical instruction and install the linear actuator at a location with bearable load.
- When installing, do not impact or strike the linear actuator.
- When installing, prevent foreign objects from entering the product.
- The spacing for installing the linear actuator, controller, keypad and other machines should follow specifications.
- When installing, please set up an external emergency stop loop that can immediately stop the product

and cut off power.

- Ensure there is no object in the motion range of the system.
- Do not operate the product in the environment that exceeds its rated load.
- If any abnormal odor, noise, smoke, temperature rise or vibration is detected, stop the linear actuator and turn off the power immediately.

2.3 Reasonably foreseeable misuse

⚠WARNING

Risk of damage to property.

- Linear actuator must not be operated:
  (1) Outdoors
  (2) In potentially explosive atmospheres

2.4 Conversions and modifications

Modifications of the linear actuator systems are not permitted. Please contact HIWIN MIKROSYSTEM for special request.

⚠WARNING

Risk of personal injury or damage to property.

- Conversions or modifications to linear actuator are prohibited.

2.5 Residual risks

⚠CAUTION

Risk of personal injury or damage to property.

◆ During normal operation, there are no residual risks associated with linear actuator components. Warnings about risks that may arise during commissioning, maintenance and repair work are provided in the relevant sections.

2.6 Personnel requirements

- Operation staff are trained in the safe operation practices for linear actuator systems and have fully read and understood this user manual.
- Maintenance staff maintain and repair linear actuator systems in such a way that they pose no danger to people, property or the environment.
- Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products.

⚠CAUTION

◆ Only authorized and competent ones may carry out work on linear actuator components. They must be familiar with the safety equipment and regulations before starting work.

Table 2.6.1

Activity	Qualification
Commissioning	Trained specialist personnel of the dealer or manufacturer
Normal Operation	Trained personnel
Cleaning	Trained personnel
Maintenance	Trained specialist personnel of the dealer or manufacturer
Repairs	Trained specialist personnel of the dealer or manufacturer

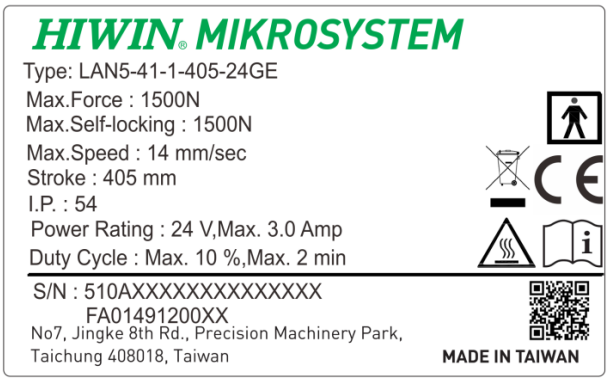
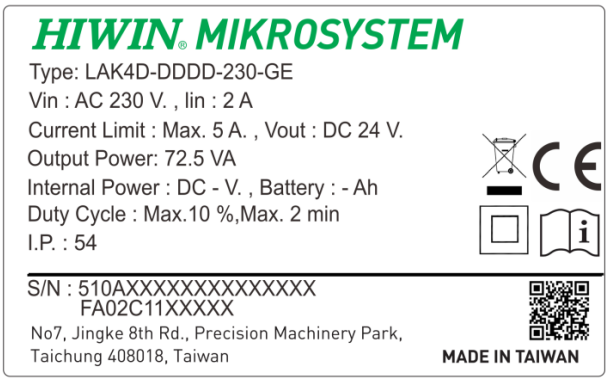
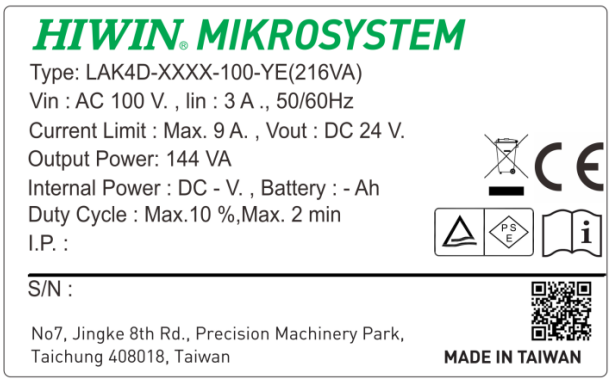
2.7 Protective equipment

Possible safety equipment / measures:

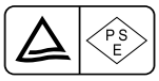
- Personal protective equipment in accordance with regional regulations.
- Zero-contact protective equipment.
- Mechanical protective equipment.

2.8 Labels on linear actuator

Table 2.8.1

Linear Actuator	Keypad
	
Controller	**Controller (PSE)**
	

CE	The product is qualified by CE.		The protection class of anti-shock of the product is B.
	The product has double protection.		The product will generate high temperature.

	Read the instruction manual before using the product.		The protection class of anti-shock of the product is BF.
	The product is qualified by UL and CSA.		The product is qualified by PSE.
	The product (electrical and electronic equipment) should not be placed in municipal waste. Please check local regulations for disposal of electronic products.		

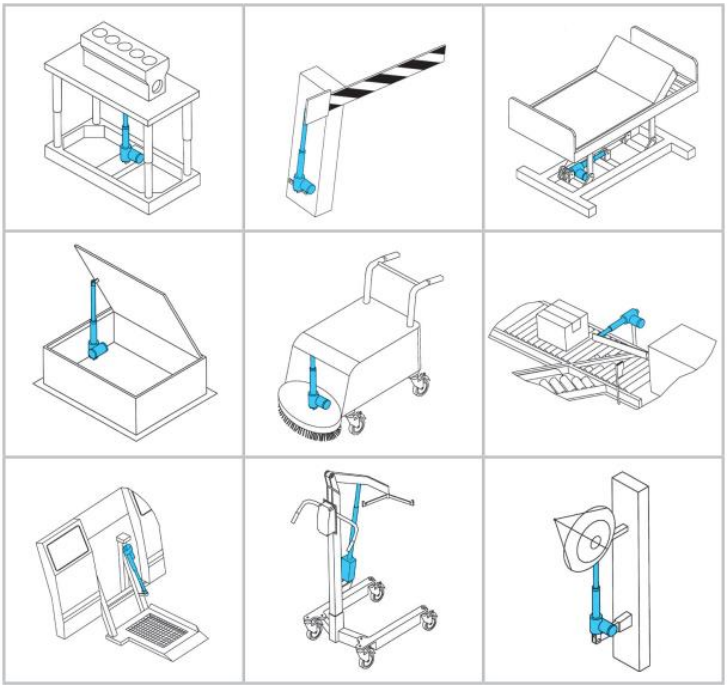
3. Product description

3.1 Linear actuator description

A linear actuator is a linear motion device that replaces traditional hydraulic cylinders with electric power. The controller supplies power to generate push-pull actions. The movement of the linear actuator is a straight line, so keep the linear actuator body straight when it is installed. The linear actuator provides safe, low-noise, and low-pollution actions with accurate motion control. Compared with hydraulic systems, the linear actuator has the following characteristics: easy installation, small size, light weight, compact structure, convenient operation, high rigidity, because it has no pumps or hoses and other parts.

Applications:

- Automation equipment
- Automatic windows and doors
- Automatic cupboards
- Automatic satellite antennas
- Automatic wheelchairs
- Automatic hospital beds
- Automatic PC desks
- Home facilities
- Patient lifters
- Massage chairs
- Traffic facilities
- Rehabilitation equipment



◆ The appearances of LAM series are as follows:

Figure 3.1.1

◆ The appearances of LAS series are as follows:

Figure 3.1.2

◆ The appearances of LAN series are as follows:

Figure 3.1.3

◆ The appearances of LAC series are as follows:

Figure 3.1.4

3.2 Main components of linear actuator

Table 3.2.1

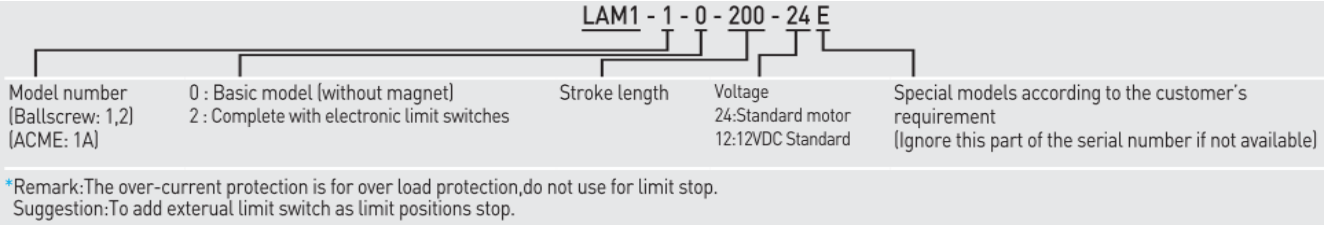
Type	Max. Thrust (N)	Max. Pulling (N)	Max. Holding (N)	Speed (mm/s)
LAM1 series	2000~4000	2000~3000	1200~4000	8~21
LAM2 series	1500~3500	1500~3500	1500~3000	2~12
LAM3 series	2000~6000	2000~5000	1500~5000	4~14.5
LAS1 series	600~1200	600~1200	300~800	8~25
LAS2 series	1800	1200	1800	4.5~7
LAS3 series	600~1200	600~1200	300~800	8~25
LAS4 series	300~800	300~800	200~600	10~55
LAN1 series	3000~5000	3000~5000	3000~5000	3~10
LAN3A series	5000~12000	5000~6000	5000~12000	3~12.5
LAN3A(Q) series	5000~12000	5000~6000	5000~12000	4.5~18
LAN4 series	1500~3500	1500~3500	1500~3500	3.5~20
LAN5 series	3000~8000	2000~4000	1500~6000	2~9
LAN5(Q) series	3000~7000	2000~4000	1500~6000	5~19
LAC1 series	2000	500	2000	8~12
LAC1(Q) series	2000	500	2000	13~16

- Input voltage: 24VDC or 12VDC; tolerance ±10%
  The input voltage of the product is indicated on the label or in the enclosed document.
- Protection class: IP54 (if not specially indicated)
- Atmospheric pressure: 860~1060 hpa (12.5~15.4 psi)

3.3 Order code

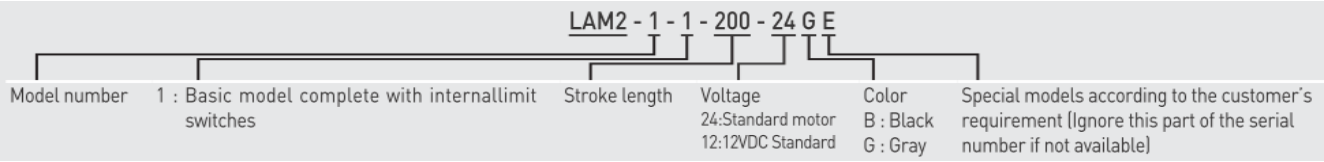
3.3.1 Model explanation

◆ LAM1 series

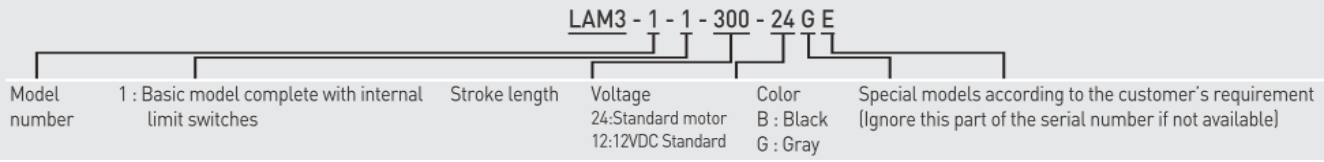


*Remark:The over-current protection is for over load protection,do not use for limit stop.
Suggestion:To add exterual limit switch as limit positions stop.

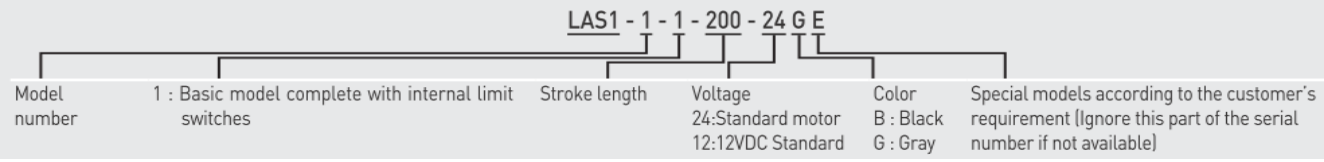
◆ LAM2 series



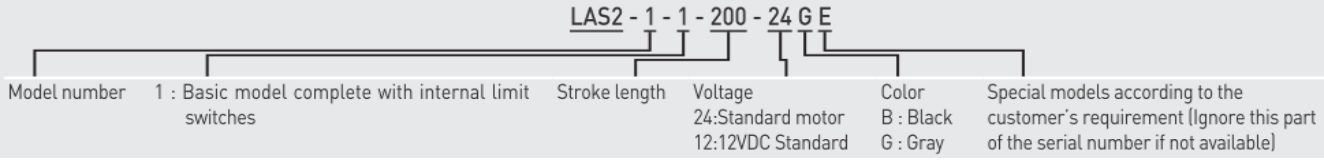
◆ LAM3 series



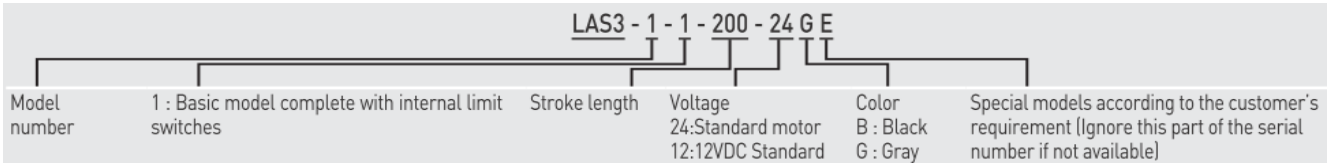
◆ LAS1 series



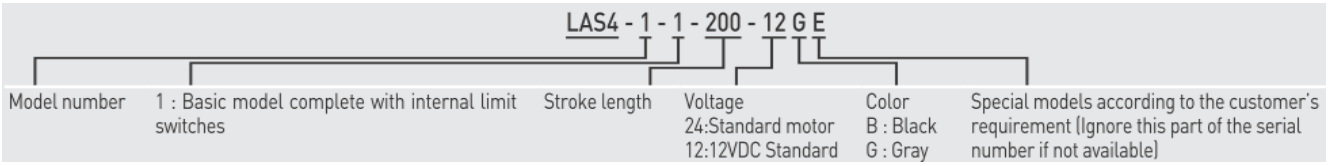
◆ LAS2 series



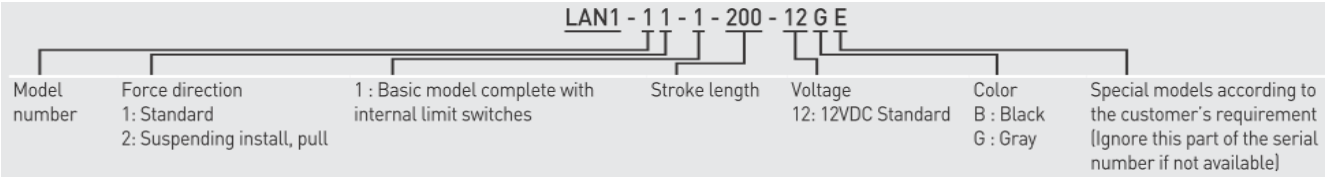
◆ LAS3 series



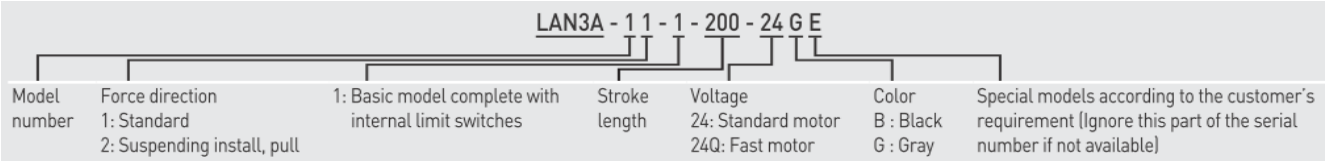
◆ LAS4 series



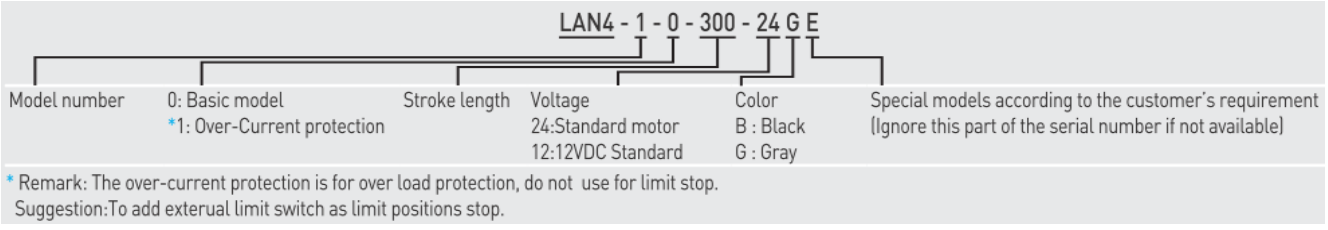
◆ LAN1 series



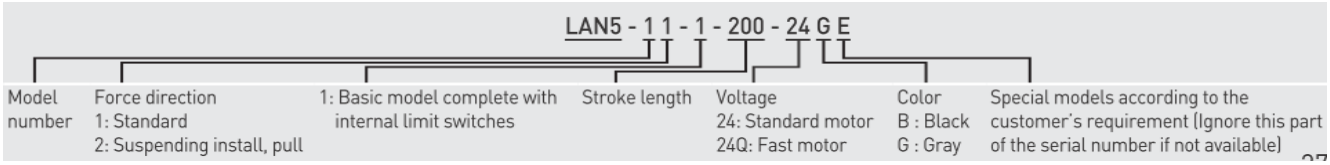
◆ LAN3A series



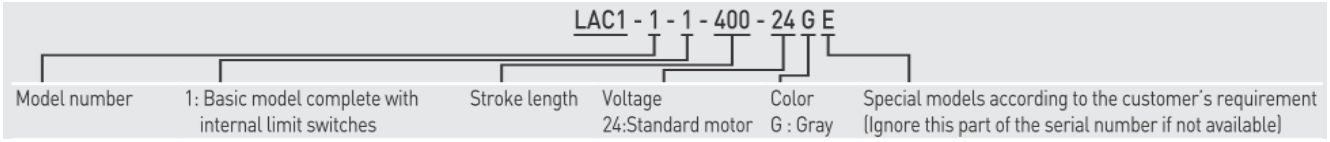
◆ LAN4 series



◆ LAN5 series



◆ LAC1 series



3.3.2 Technical data

3.3.2.1 LAM1 series

Table 3.3.2.1.1

Model	Screw Type	Max. Thrust (N)	Max. Pulling (N)	Max. Holding (N)	Speed (mm/s)	Stroke (mm)	Max. Current (A)	
							12VDC	24VDC
LAM1-1	Ball screw	4000	3000	4000	8 / 11	100~400	12	6
LAM1-2	Ball screw	2000	2000	1200	16 / 21	100~400	12	6
LAM1-1A	ACME	3000	3000	3000	8 / 11	100~400	12	6

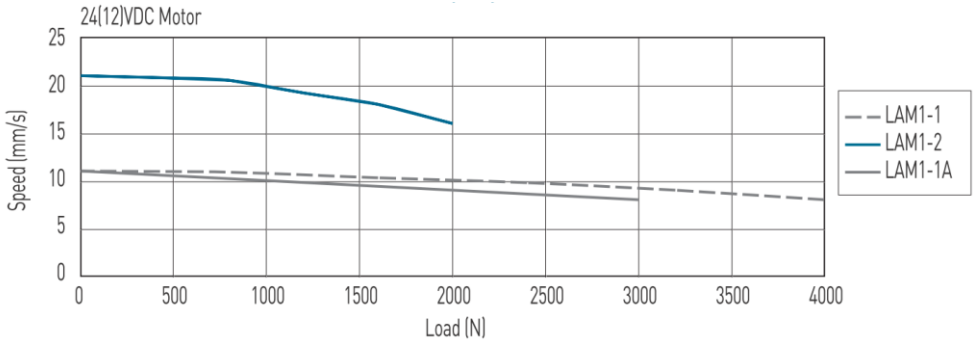


Figure 3.3.2.1.1

3.3.2.2 LAM2 series

Table 3.3.2.2.1

Model	Max. Thrust (N)	Max. Pulling (N)	Max. Holding (N)	Speed (mm/s)	Stroke (mm)	Max. Current (A)		MR Sensor (mm/pulse)
						12VDC	24VDC	
LAM2-1	3500	3500	3000	2 / 3.5	100~300	8	4	0.1
LAM2-2	2500	2500	2000	3 / 6	100~300	8	4	0.16
LAM2-3	1500	1500	1500	6.5 / 12	100~300	6	3	0.32

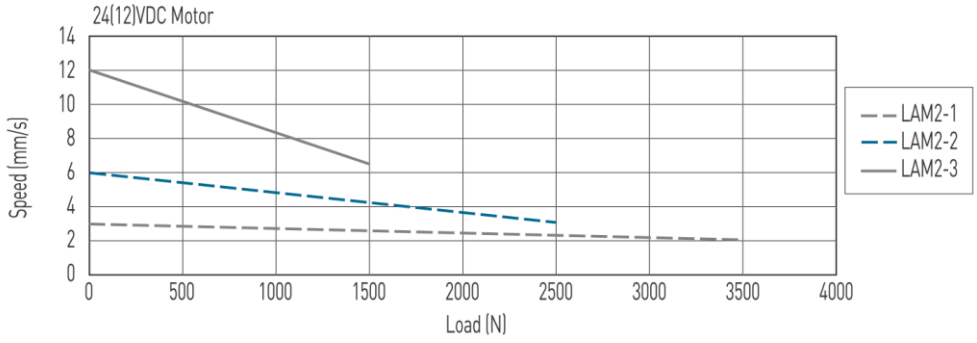


Figure 3.3.2.2.1

3.3.2.3 LAM3 series

Table 3.3.2.3.1

Model	Max. Thrust (N)	Max. Pulling (N)	Max. Holding (N)	Speed (mm/s)	Stroke (mm)	Max. Current (A)	
						12VDC	24VDC
LAM3-1	6000	5000	5000	4 / 5.5	100~400	12	6
LAM3-2	4000	4000	4000	5.5 / 7.5	100~400	10	5
LAM3-4	2000	2000	1500	11.5 / 14.5	100~400	8	4

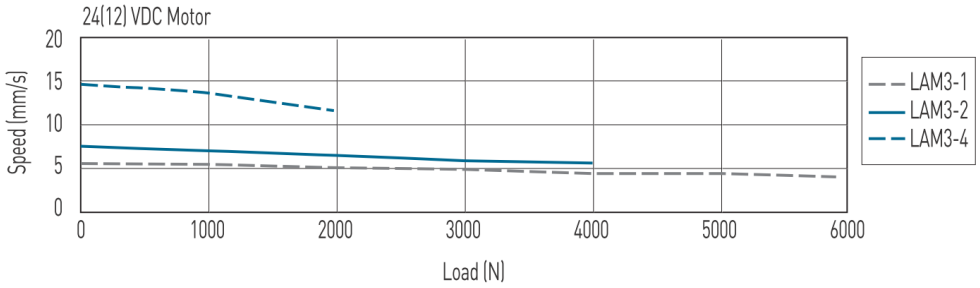


Figure 3.3.2.3.1

3.3.2.4 LAS1 series

Table 3.3.2.4.1

Model	Max. Thrust (N)	Max. Pulling (N)	Max. Holding (N)	Speed (mm/s)	Stroke (mm)	Max. Current (A)	
						12VDC	24VDC
LAS1-1	1200	1200	800	8 / 12	50~300	6	2.5
LAS1-2	600	600	300	16 / 25	50~300	6	3

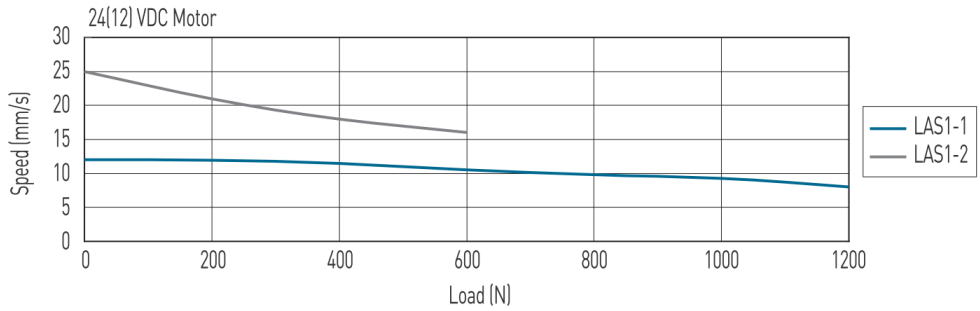


Figure 3.3.2.4.1

3.3.2.5 LAS2 series

Table 3.3.2.5.1

Model	Max. Thrust (N)	Max. Pulling (N)	Max. Holding (N)	Speed (mm/s)	Stroke (mm)	Max. Current (A)		Hall Sensor (mm/pulse)	POT (Ohm/mm)
						12VDC	24VDC		
LAS2-1	1800	1200	1800	4.5 / 7	50~250	6	3	0.3175	21

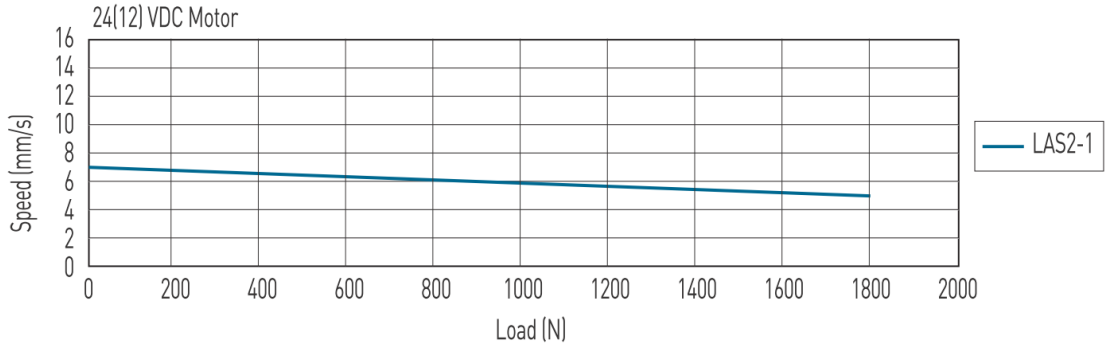


Figure 3.3.2.5.1

3.3.2.6 LAS3 series

Table 3.3.2.6.1

Model	Max. Thrust (N)	Max. Pulling (N)	Max. Holding (N)	Speed (mm/s)	Stroke (mm)	Max. Current (A)		Hall Sensor (mm/pulse)	POT (Ohm/mm)
						12VDC	24VDC		
LAS3-1	1200	1200	800	8 / 12	50~250	6	2.5	0.3175	21
LAS3-2	600	600	300	16 / 25	50~250	6	3	0.635	10.5

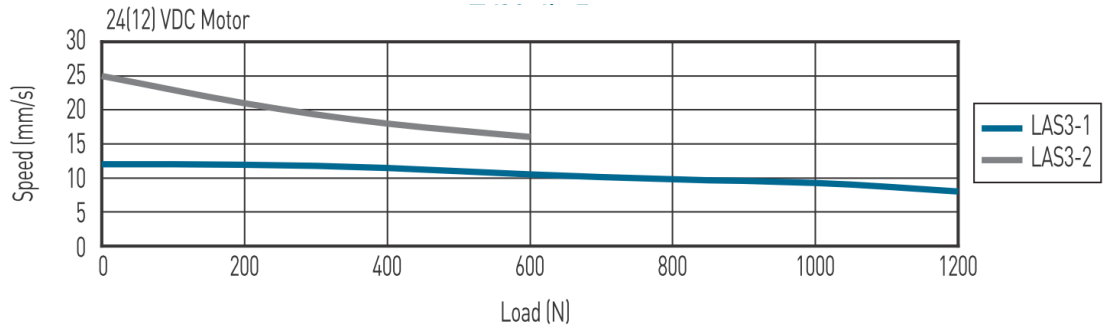


Figure 3.3.2.6.1

3.3.2.7 LAS4 series

Table 3.3.2.7.1

Model	Max. Thrust (N)	Max. Pulling (N)	Max. Holding (N)	Speed (mm/s)	Stroke (mm)	Max. Current (A)		Hall Sensor (mm/pulse)
						12VDC	24VDC	
LAS4-1	800	800	600	10 / 15	10~300	5	2.3	0.0085
LAS4-2	300	300	200	30 / 55	100~300	6	3.6	0.02

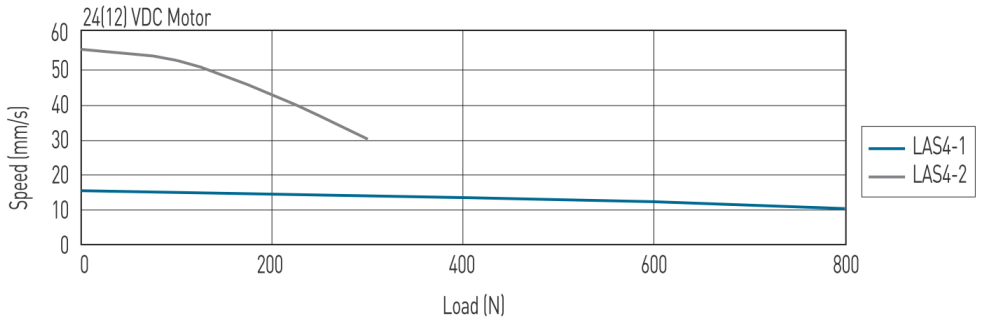


Figure 3.3.2.7.1

3.3.2.8 LAN1(12V) series

Table 3.3.2.8.1

Model	Max. Thrust (N)	Max. Pulling (N)	Max. Holding (N)	Speed (mm/s)	Stroke (mm)	Max. Current (A)	Hall Sensor (mm/pulse)
LAN1-1	5000	5000	5000	3 / 6	100~250	11	0.3
LAN1-2	4000	4000	4000	4 / 8	100~250	11	0.4
LAN1-3	3000	3000	3000	5 / 10	100~250	10	0.5

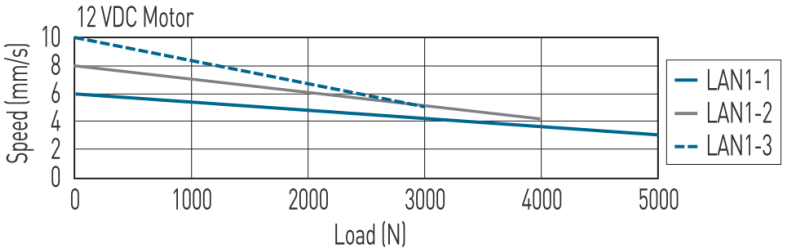


Figure 3.3.2.8.1

3.3.2.9 LAN3A(24V) series

Table 3.3.2.9.1

Model	Max. Thrust (N)	Max. Pulling (N)	Max. Holding (N)	Speed (mm/s)	Stroke (mm)	Max. Current (A)	POT (Ohm/mm)	MR Sensor (mm/pulse)
LAN3A-1	12000	6000	12000	3 / 5	100~350	8.3	33.3	0.1
LAN3A-2	10000	6000	10000	4.5 / 8	100~400	8.3	22.2	0.16
LAN3A-3	7000	6000	7000	7 / 9	100~450	8	16.7	0.22
LAN3A-4	5000	5000	5000	9.5 / 12.5	100~500	7	13.3	0.27

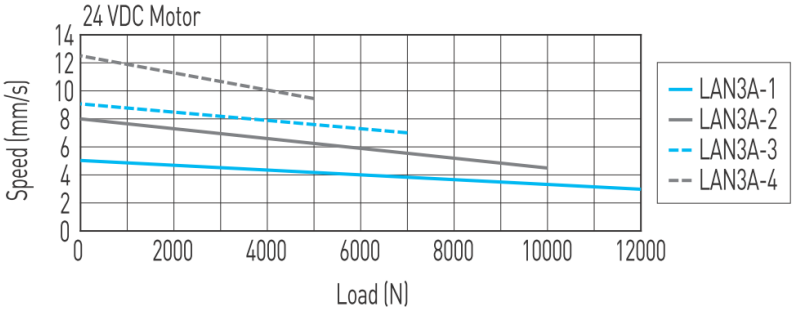


Figure 3.3.2.9.1

3.3.2.10 LAN3A(24Q) series

Table 3.3.2.10.1

Model	Max. Thrust (N)	Max. Pulling (N)	Max. Holding (N)	Speed (mm/s)	Stroke (mm)	Max. Current (A)	POT (Ohm/mm)	MR Sensor (mm/pulse)
LAN3A-1	12000	6000	12000	4.5 / 7	100~350	12	33.3	0.1
LAN3A-2	10000	6000	10000	7 / 11	100~400	12	22.2	0.16
LAN3A-3	7000	6000	7000	9 / 13	100~450	12	16.7	0.22
LAN3A-4	5000	5000	5000	13 / 18	100~500	12	13.3	0.27

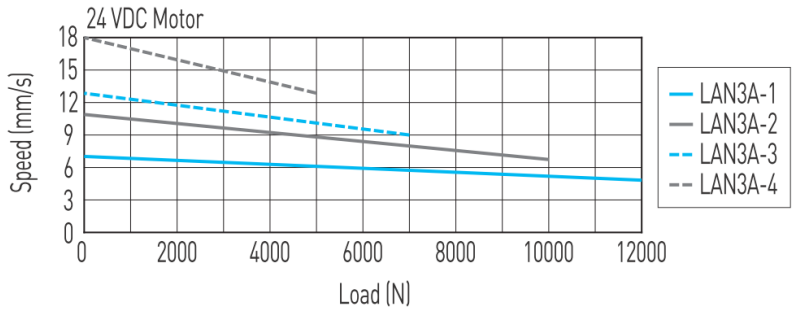


Figure 3.3.2.10.1

3.3.2.11 LAN4 series

Table 3.3.2.11.1

Model	Max. Thrust (N)	Max. Pulling (N)	Max. Holding (N)	Speed (mm/s)	Stroke (mm)	Max. Current (A)	
						12VDC	24VDC
LAN4-1	3500	3500	3500	3.5 / 7	100~400	12	6
LAN4-2	3000	3000	3000	4.2 / 9	100~400	12	6
LAN4-3	2000	2000	2000	6 / 13	100~400	12	6
LAN4-4	1500	1500	1500	8.5 / 20	100~400	12	6

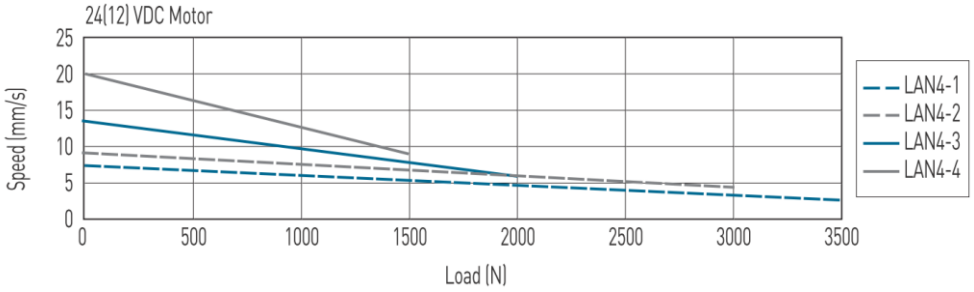


Figure 3.3.2.11.1

3.3.2.12 LAN5(24V) series

Table 3.3.2.12.1

Model	Max. Thrust (N)	Max. Pulling (N)	Max. Holding (N)	Speed (mm/s)	Stroke (mm)	Max. Current (A)	Hall Sensor (mm/pulse)
LAN5-1	8000	4000	6000	2 / 3.5	100~200	5	0.08
LAN5-2	6000	4000	5000	3 / 4.5	100~250	4.5	0.1
LAN5-3	4000	3000	4000	4 / 5.5	100~300	4	0.14
LAN5-4	3000	2000	1500	6 / 9	100~300	4	0.22

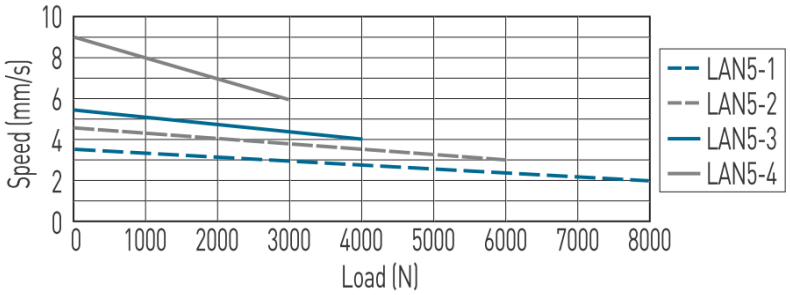


Figure 3.3.2.12.1

3.3.2.13 LAN5(24Q) series

Table 3.3.2.13.1

Model	Max. Thrust (N)	Max. Pulling (N)	Max. Holding (N)	Speed (mm/s)	Stroke (mm)	Max. Current (A)	Hall Sensor (mm/pulse)
LAN5-1	7000	4000	6000	5 / 7	100~200	8	0.08
LAN5-2	6000	4000	5000	7 / 9	100~250	8	0.1
LAN5-3	4000	3000	4000	9 / 11	100~300	6	0.14
LAN5-4	3000	2000	1500	14 / 19	100~300	6	0.22

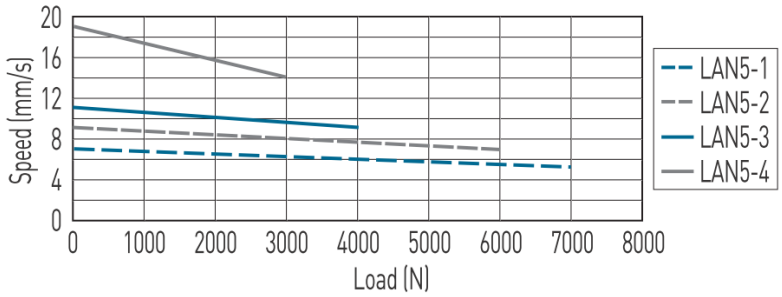


Figure 3.3.2.13.1

3.3.2.14 LAC1(24V) series

Table 3.3.2.14.1

Model	Max. Thrust (N)	Max. Pulling (N)	Max. Holding (N)	Speed (mm/s)	Stroke (mm)	Max. Current (A)	POT (Ohm/mm)	Hall Sensor (mm/pulse)
LAC1-1	2000	500	2000	8 / 12	300~500	5	6.67	0.064

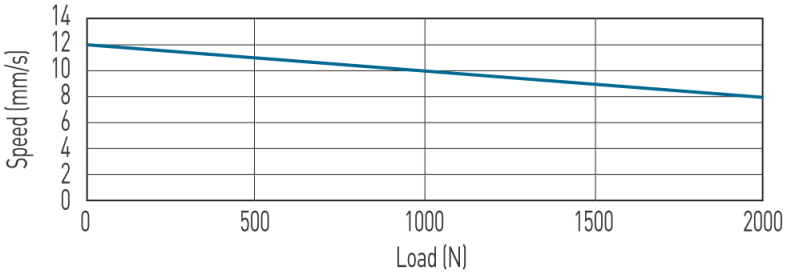


Figure 3.3.2.14.1

3.3.2.15 LAC1(24Q) series

Table 3.3.2.15.1

Model	Max. Thrust (N)	Max. Pulling (N)	Max. Holding (N)	Speed (mm/s)	Stroke (mm)	Max. Current (A)	POT (Ohm/mm)	Hall Sensor (mm/pulse)
LAC1-1	2000	500	2000	13 / 16	300~500	8	6.67	0.064

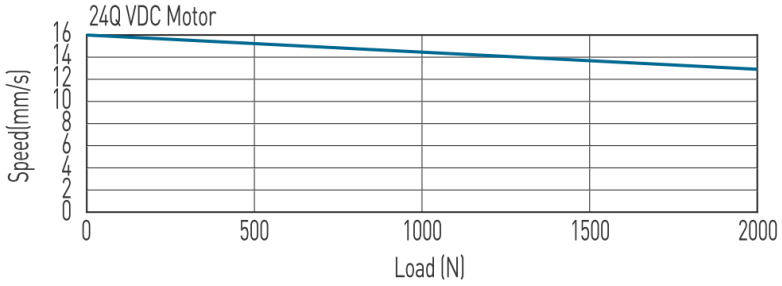


Figure 3.3.2.15.1

3.3.3 Mechanical overview

3.3.3.1 Mechanical structure

- LAM1 series

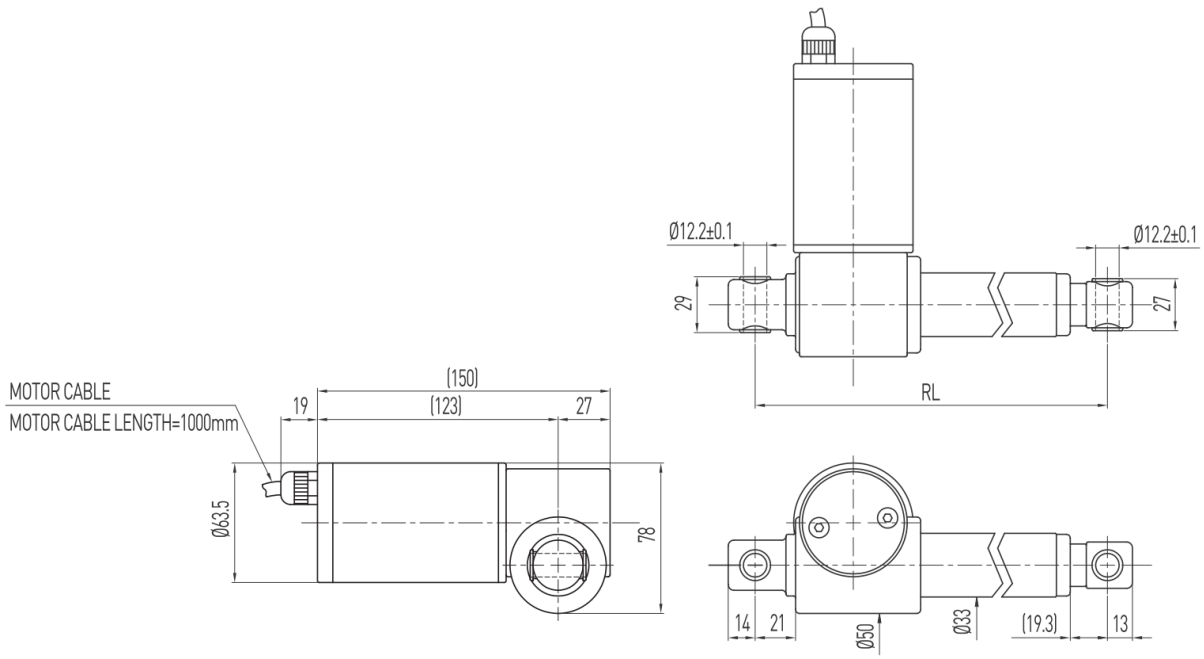


Figure 3.3.3.1.1

◆ LAM2 series

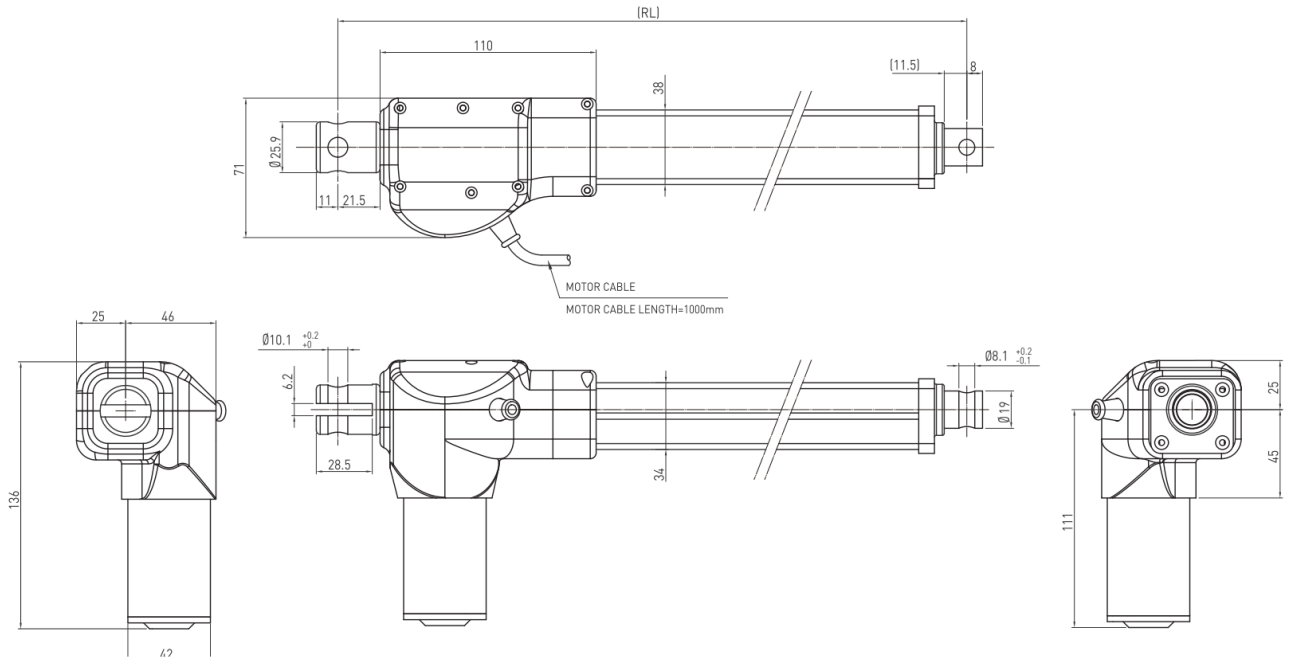


Figure 3.3.3.1.2

◆ LAM3 series

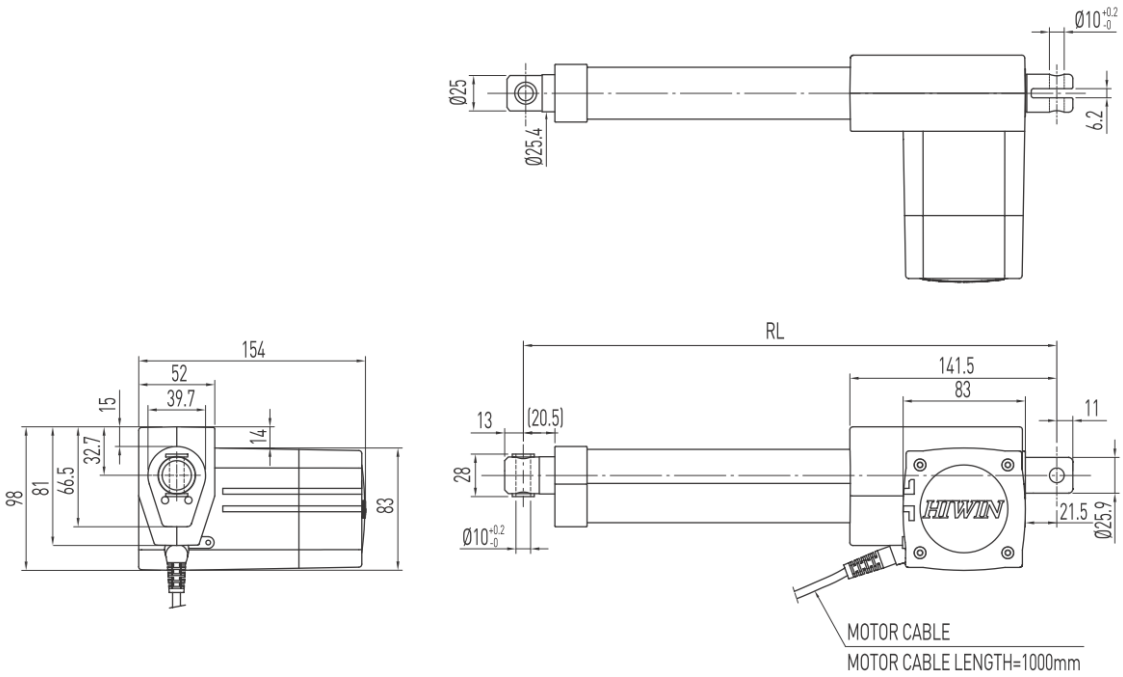


Figure 3.3.3.1.3

◆ LAS1 series

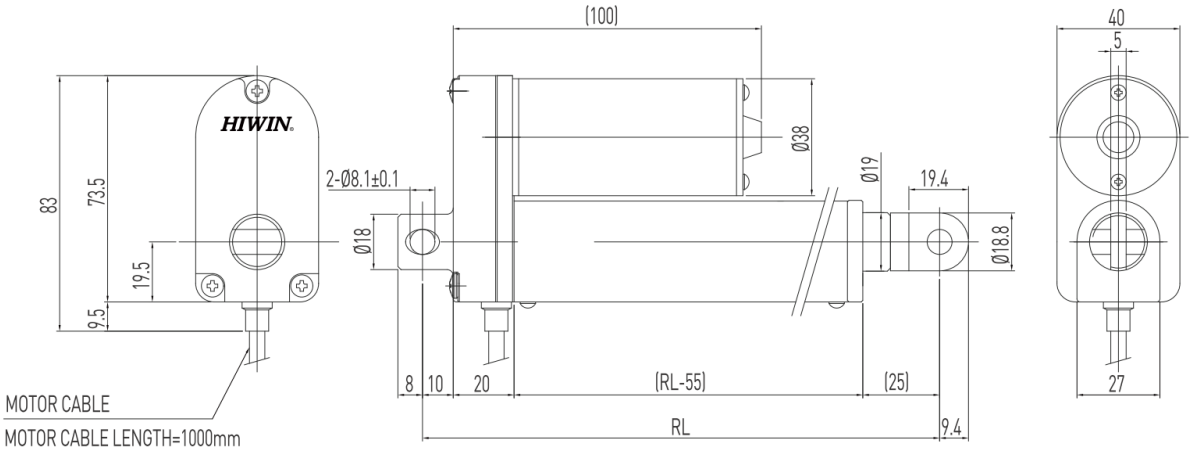


Figure 3.3.3.1.4

◆ LAS2 series

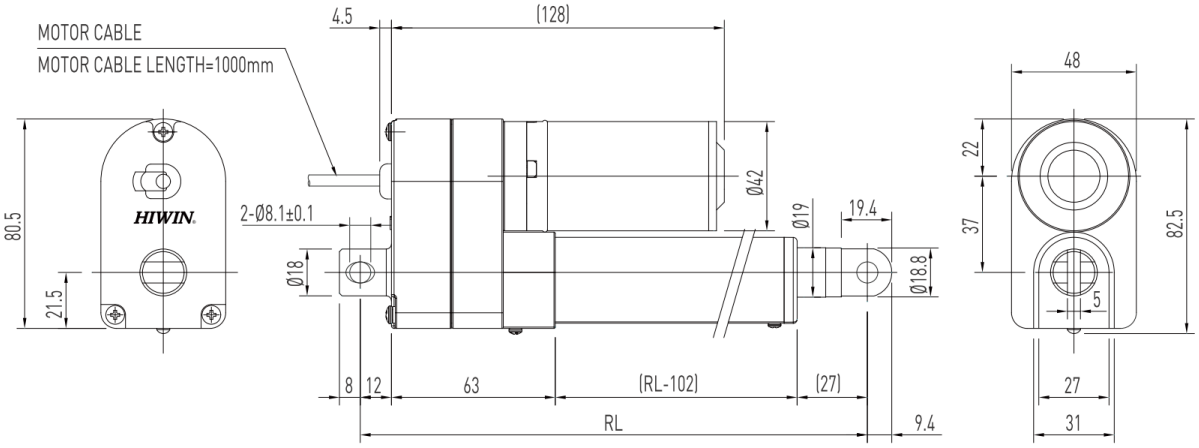


Figure 3.3.3.1.5

◆ LAS3 series

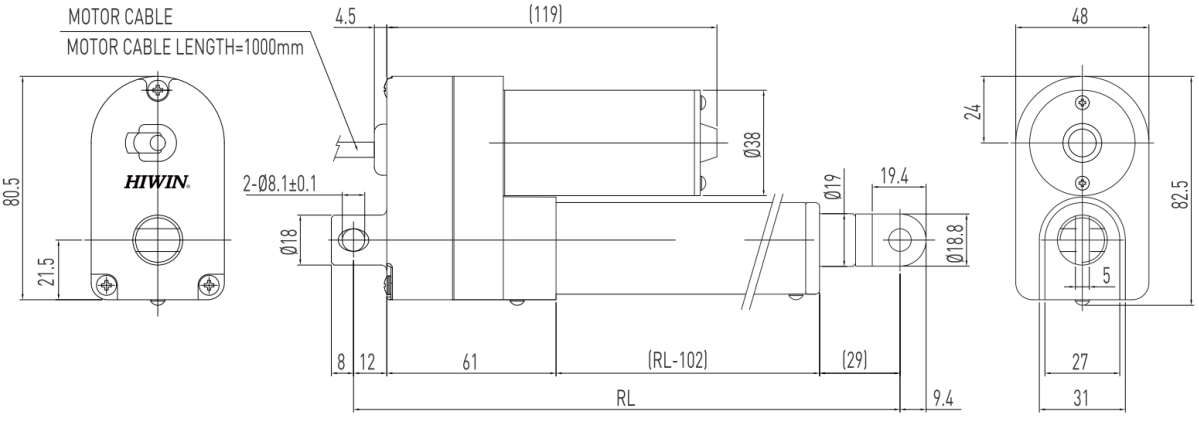


Figure 3.3.3.1.6

◆ LAS4 series

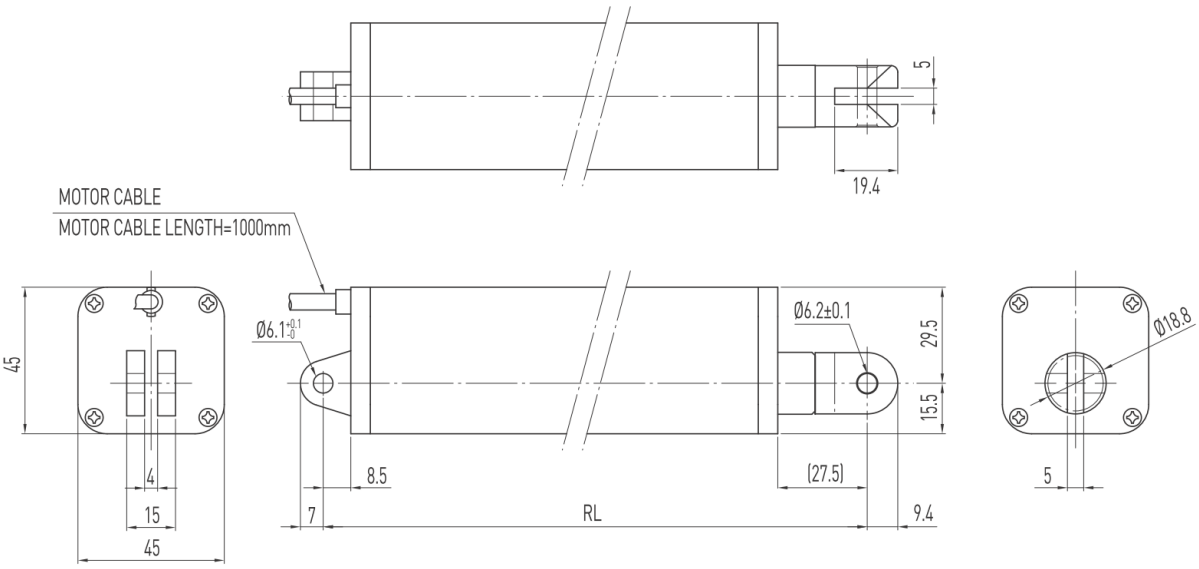


Figure 3.3.3.1.7

◆ LAN1 series

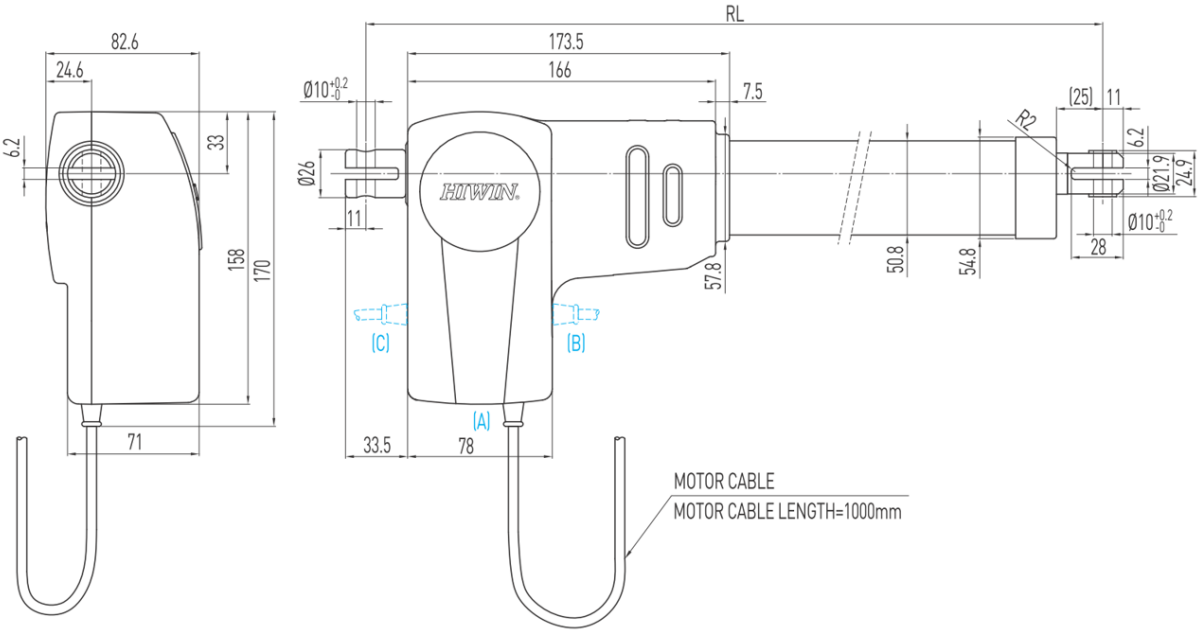


Figure 3.3.3.1.8

◆ LAN3A series

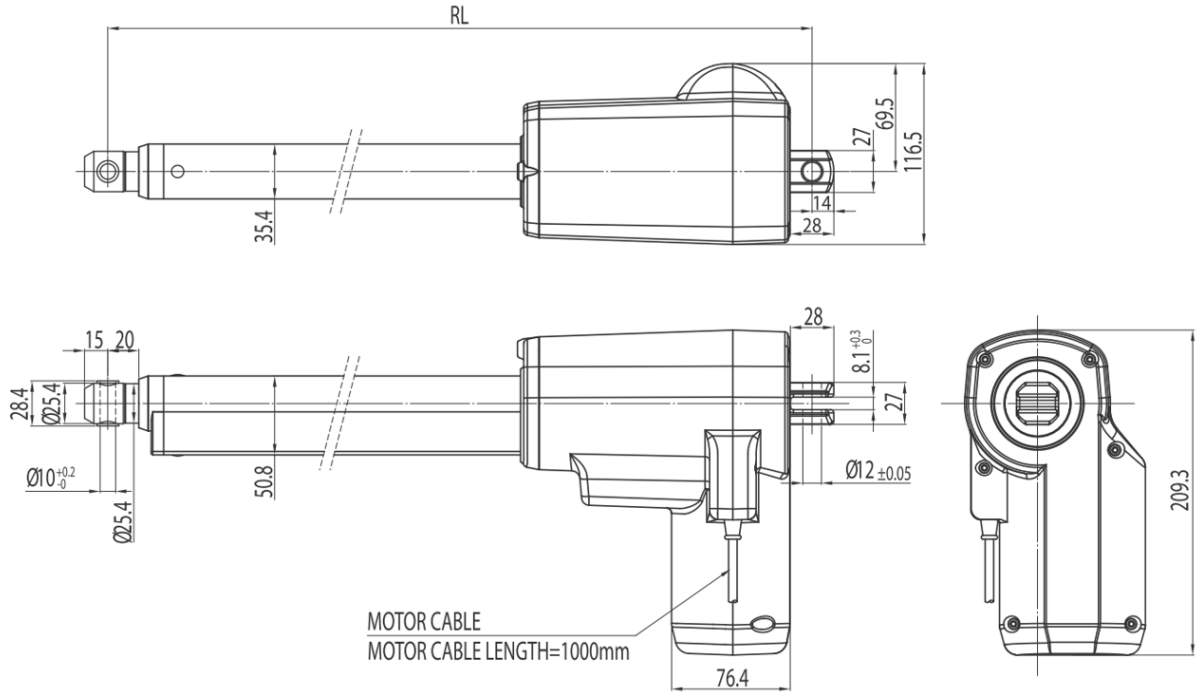


Figure 3.3.3.1.9

◆ LAN4 series

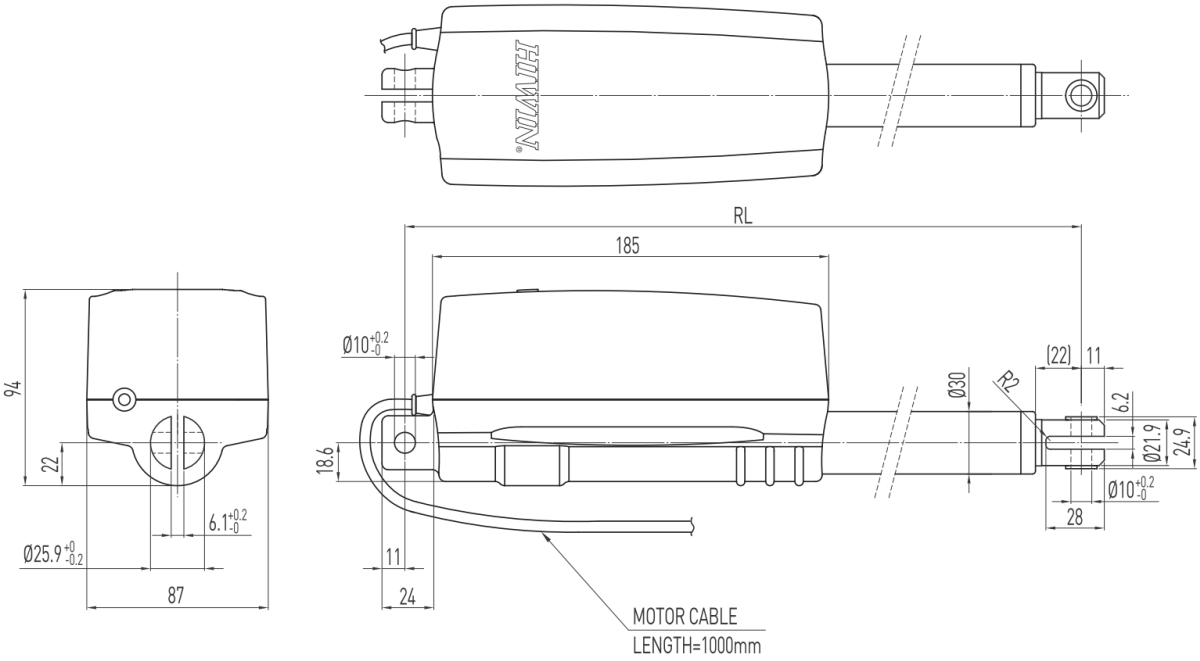


Figure 3.3.3.1.10

◆ LAN5 series

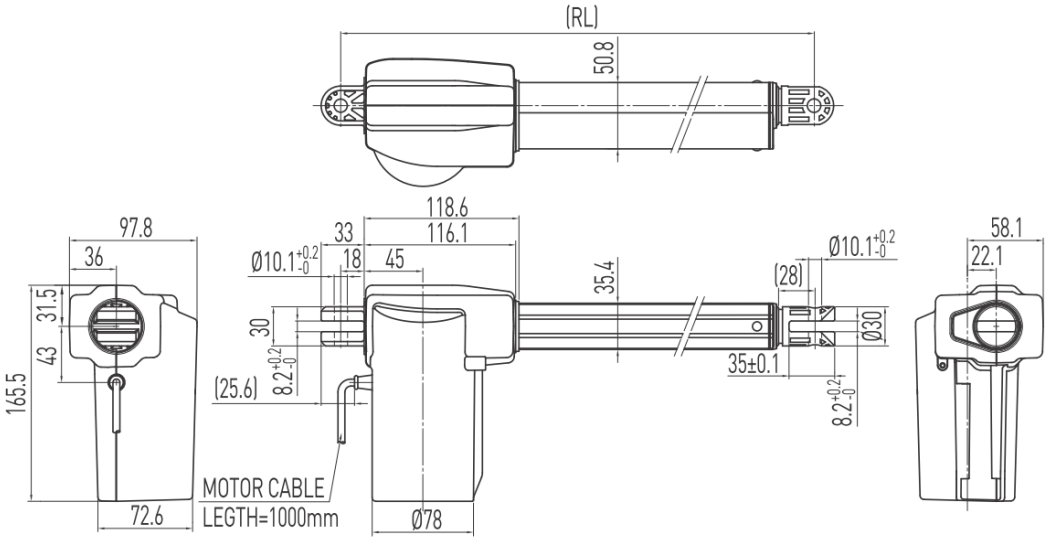


Figure 3.3.3.1.11

◆ LAC1 series

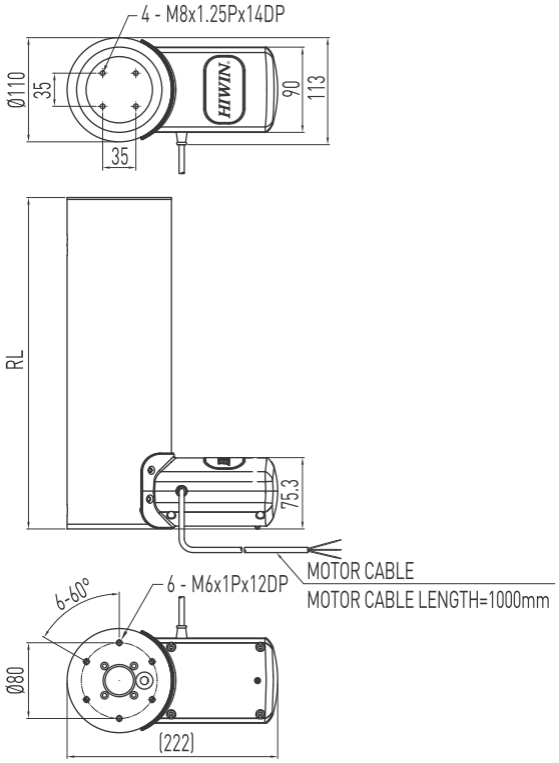


Figure 3.3.3.1.12

Note: Refer to the catalog for the dimension of the retracted length (RL).

3.3.3.2 Spline function

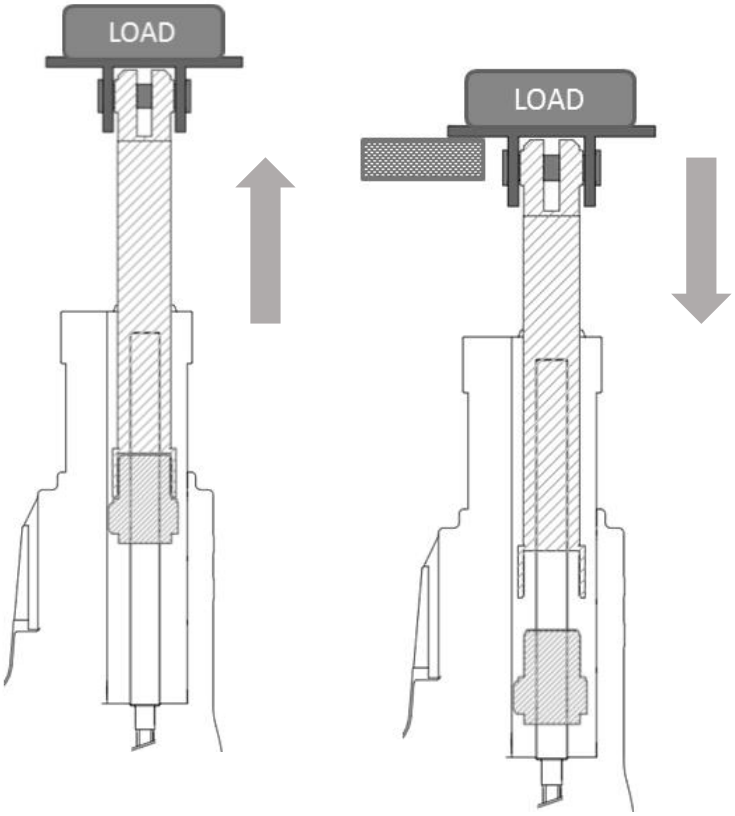


Figure 3.3.3.2.1

- If the linear actuator is interfered by an object during the retraction process, it will continue driving the mechanism back to the bottom, and the inner tube group will not move.
- Spline function can prevent the linear actuator from pulling the structure hard, avoiding the mechanism damage or personal injury.
- The linear actuator with spline function only has push function, but no pull function.
- When the linear actuator with spline function does not work, the inner tube can be pulled.

3.3.3.3 Quick release function

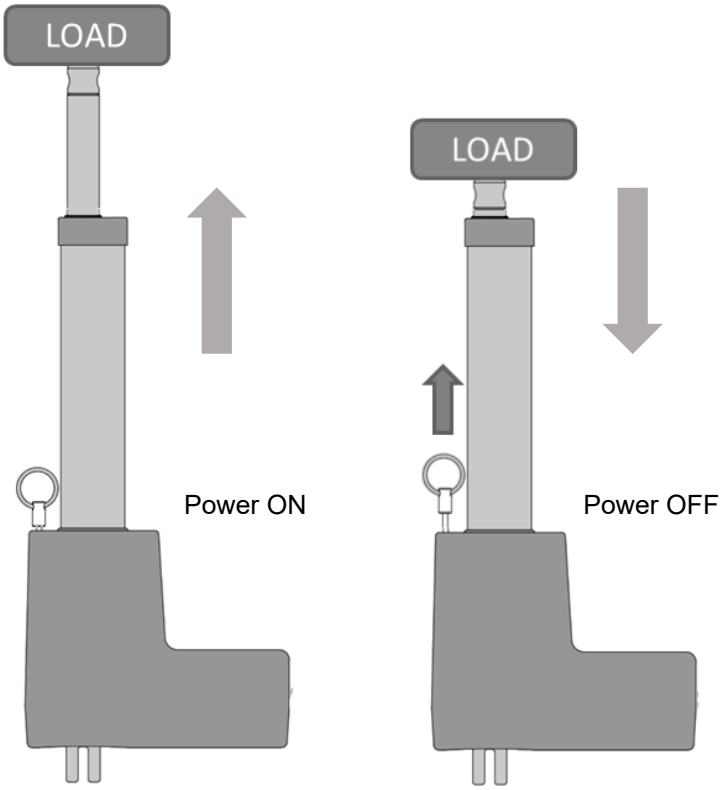


Figure 3.3.3.3.1

- Quick release function can be used when there is no power supply or the load needs to be lowered quickly in an emergency.
- The linear actuator needs to be loaded for the quick release function to work.
- Both LAN3A and LAN5 series have optional quick release function, only the operating mechanism is different.

3.3.4 Controller related

◆ LAK2LN series

LAK2LN can be used with single-axis linear actuator attached with external limit switch.
The output power of controller is 108VA (The output voltage is 24VDC).
Fuse specification: 2A/20mm (220/230VAC), 3A/20mm (100/110VAC).

◆ LAK2 series

LAK2 can be used with single-axis or dual-axis linear actuators. For the sake of safety, two linear actuators cannot be operated simultaneously. Do not press the △ key and ▽ key at the same time.
The output power of controller is 108VA (The output voltage is 24VDC).
LAK2 can be directly driven by DC (12VDC/24VDC); the output power depends on the maximum power of power supply.
Fuse specification: 2A/20mm (220/230VAC), 3A/20mm (100/110VAC), 15A/20mm (12VAC).

◆ LAK2 series (UL)

LAK2 can be used with single-axis or dual-axis linear actuators. For the sake of safety, two linear actuators cannot be operated simultaneously. Do not press the △ key and ▽ key at the same time.
The maximum output power of controller is 144VA.
The input power is 100~240VAC.
Overcurrent setting: Code A: 2.5A, Code B: 3A, Code C: 4A, Code D: 5A, Code E: 6A.

◆ LAK2BN series

LAK2BN can be used with single-axis or dual-axis linear actuators. It is an intelligent controller, so the application software can be designed based on requirement.
The output power of controller is 144VA (The output voltage is 24VDC).
1.3Ah or 2.9Ah lead-acid battery can be selected; it has built-in automatic charging circuit, so there is no need to add external charger.
Fuse specification: 2A/20mm (220/230VAC), 3A/20mm (100/110VAC), 10A/20mm (Battery).

⚠CAUTION

◆ Please charge the battery for at least 8 hours before initial use.

◆ LAK2D series

LK2D can be used with single-axis or dual-axis linear actuators. For the sake of safety, two linear actuators cannot be operated simultaneously. Do not press the △ key and ▽ key at the same time. The output power of controller is 108VA (The output voltage is 24VDC).

LAK2D is equipped with automatic protection device, which can avoid the overcurrent caused by overload or other abnormal situations; two 9V alkaline batteries can be added during temporary interruption to reduce the load.

LAK2D has no charging function, so the battery can only urgently reduce the load under a powerless state.

Fuse specification: 2A/20mm (220/230VAC), 3A/20mm (100/110VAC).

LAK2D can be used with HIWIN MIKROSYSTEM linear actuator LAM3; it is space-saving and can be easily installed (refer to the figure below).

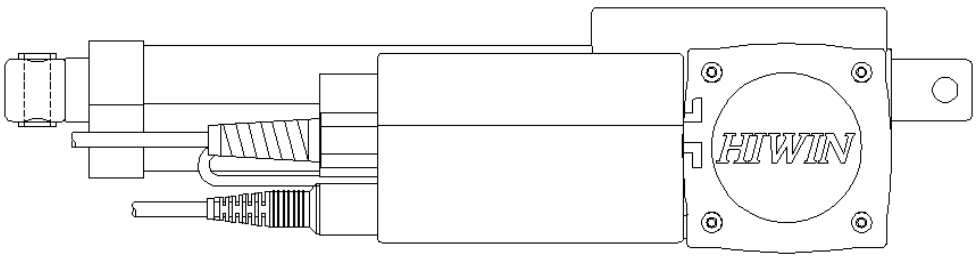


Figure 3.3.4.1

◆ LAK2J series (UL approved only DC IN versions)

LAK2J can be used with single-axis or dual-axis linear actuators.

It is a portable controller driven by two 4.5Ah, 12VDC lead-acid batteries without built-in transformer.

The EMERGENCY button on the panel can disconnect the driving function of controller to protect users.

Users can directly press the UP and DOWN buttons on the panel when there is no keypad (The buttons can only perform up and down control of the first axis).

Overcurrent protection and slow start function are provided to avoid misuse.

LAKCH-A charger is required for charging (For the sake of safety, the controller cannot be used when it is charging).

When the operation stops, after 30 seconds, the controller will automatically become energy-saving mode to increase the use time. The low-level buzz and LED power display are provided as well.

When the controller is idle, keep the controller supplied with power (power cable connected). When the controller is not in use, press the emergency button to save battery power.

Fuse specification: 15A/20mm.

Do not disconnect the plug when linear actuator is working.

⚠CAUTION
◆ Please charge the battery for at least 8 hours before initial use.

◆ LAK4D series (UL)

LAK4D can be used with single-axis to four-axis linear actuators.
The output power of controller is 72.5VA (The output voltage is 24VDC).
The bolt is provided to prevent linear actuator power cable and pluggable AC power cable from being accidentally removed as well as reduce the danger during usage.
LED power display is provided.
Fuse specification: 2A/20mm (220/230VAC), 3A/20mm (100/110VAC).
The protection class of anti-shock is BF.
The sign ⏚ on the case indicates “Functional Ground” function. (Not supported yet).
LAK4D can be used with HIWIN MIKROSYSTEM linear actuator LAN5; it has anti-loose function to prevent linear actuator from falling off; it is space-saving and can be easily installed (refer to the figure below).

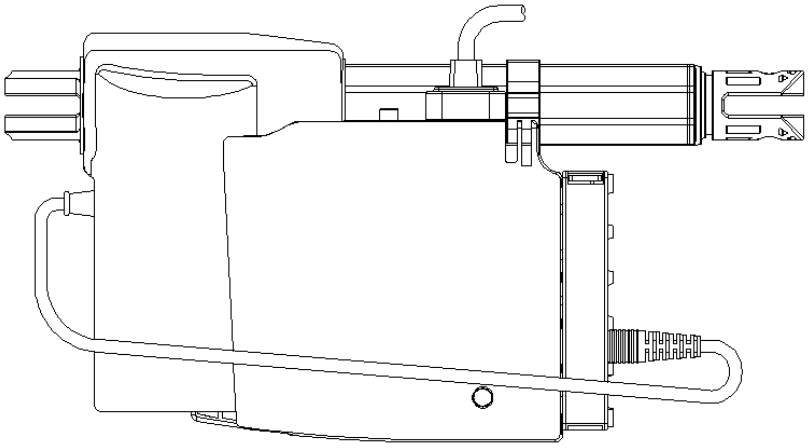


Figure 3.3.4.2

◆ LAK6B series

LAK6B can be used with single-axis to six-axis linear actuators. It is an intelligent controller, so the application software can be designed based on requirement.
The output power of a controller is 216VA (The output voltage is 24VDC.).
1.3Ah lead-acid battery can be selected; it has built-in automatic charging circuit, so there is no need to add external charger.
Overcurrent protection and slow start function are provided.
It is an energy-saving device; it has replaceable fuse, and the spare one is on the socket.
External grounding and LED power display are provided.
Fuse specification: 4A/20mm (100/110/220/230VAC).

3.3.5 Battery related

◆ Battery specification

Table 3.3.5.1

Battery Specification (20Hr)	Nominal Voltage (V)	Dimensions (mm)			Weight (kg)	Internal Resistance (mΩ)	Max. Discharge Current (A)	Max. Charge Current (A)
		L	W	H				
1.3 Ah	12	97	43	53	0.6	78	6.5	0.39
2.9 Ah	12	79	56	99	1.18	30	58	0.87
4.5 Ah	12	90	70	101	1.83	19	125	1.35

◆ Operation environment

Charge: 0°C~40°C (32°F~104°F)
Discharge: -15°C~50°C (5°F~122°F)
Storage: -15°C~40°C (5°F~104°F)

◆ Battery life

Standby usage: 3~5 years (in 2.3 Vpc floating charge and 25°C)
Cycle usage: 100% discharge is 200 cycles, 80% discharge is 225 cycles, 50% discharge is 500 cycles.

◆ Battery power depletion

The relationship among storage temperature, time and capacity is shown in the following table.

Table 3.3.5.2

Time / Temperature	1 month	2 months	6 months	12 months
0°C~5°C (32°F~41°F)	96%	93%	90%	80%
5°C~20°C (41°F~68°F)	92%	90%	80%	65%
20°C~30°C (68°F~86°F)	90%	80%	65%	50%
30°C~40°C (86°F~104°F)	83%	70%	50%	No storage

3.3.6 System overview

◆ LAK2LN series (Take LAM1 as an example)

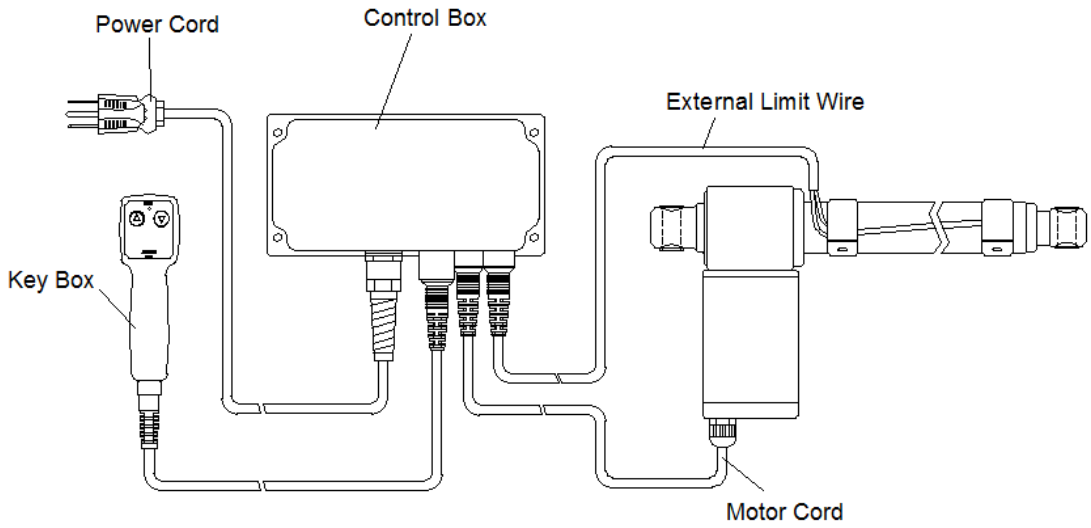


Figure 3.3.6.1

◆ LAK2 series (Take LAN5 as an example)

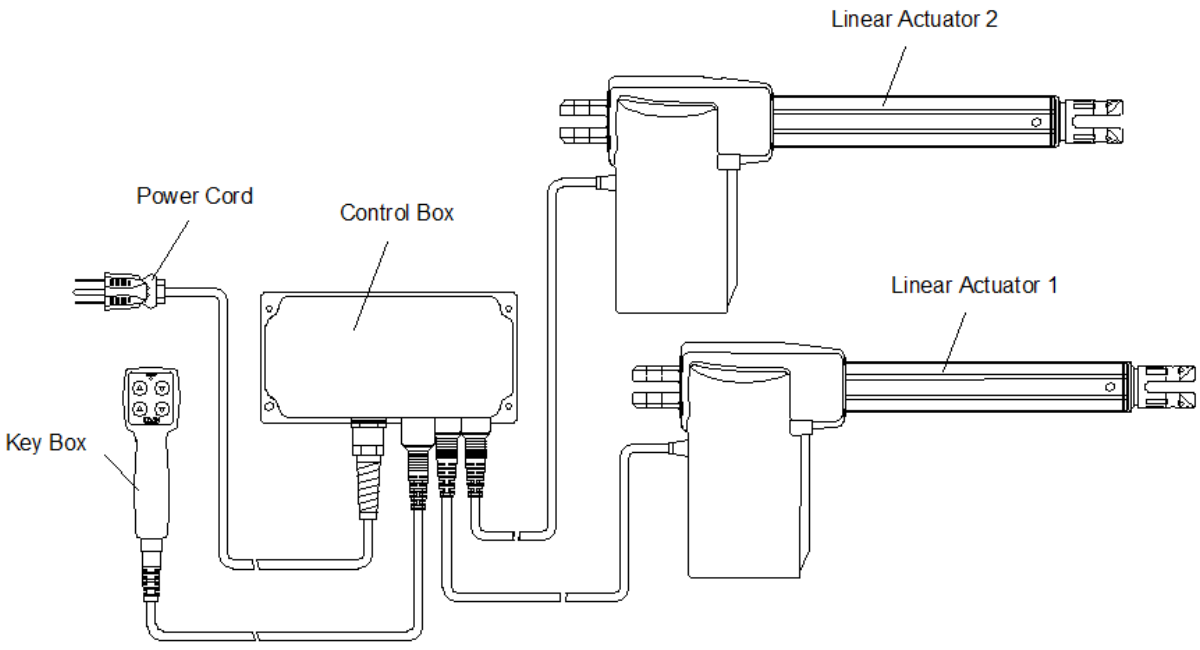


Figure 3.3.6.2

◆ LAK2BN series (Take LAN5 / LAC1 as an example)

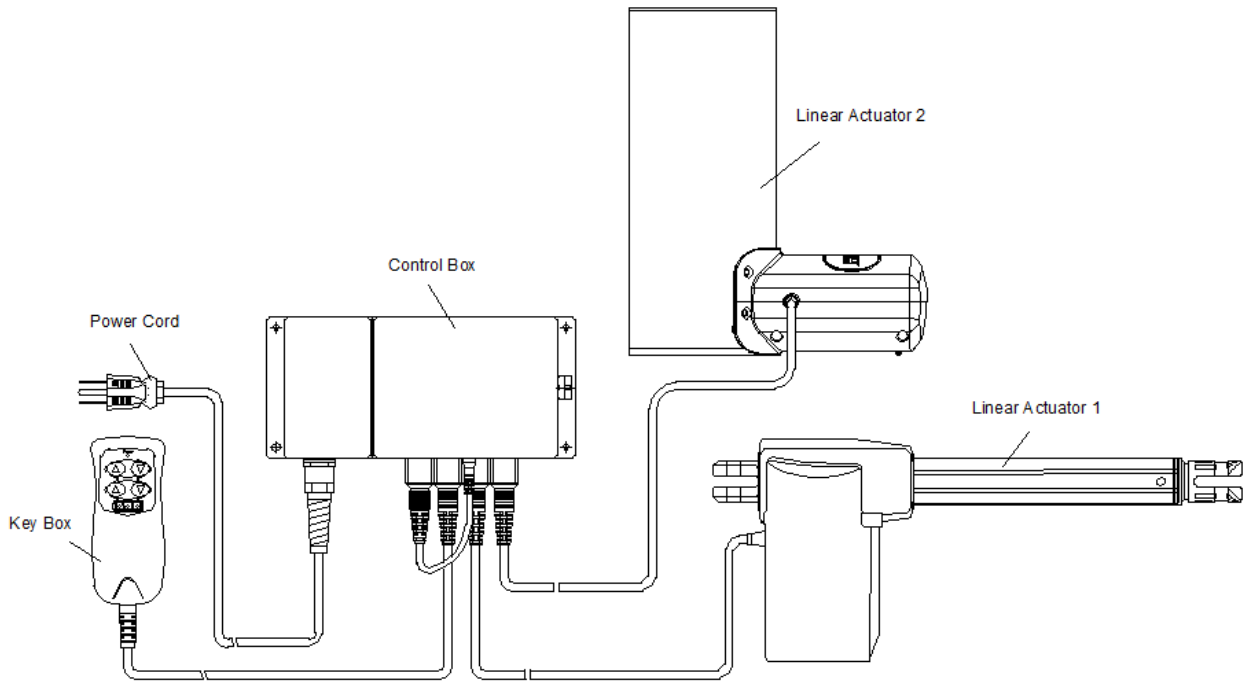


Figure 3.3.6.3

◆ LAK2D series (Take LAM3 / LAN1 as an example)

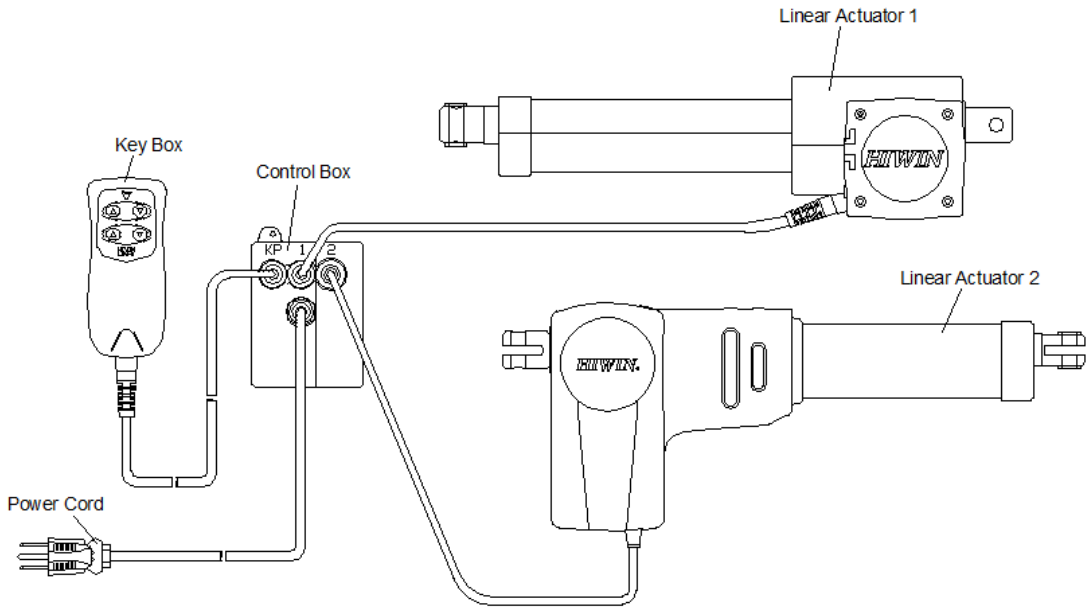


Figure 3.3.6.4

◆ LAK2J(DC-IN) series (Take LAN3A as an example)

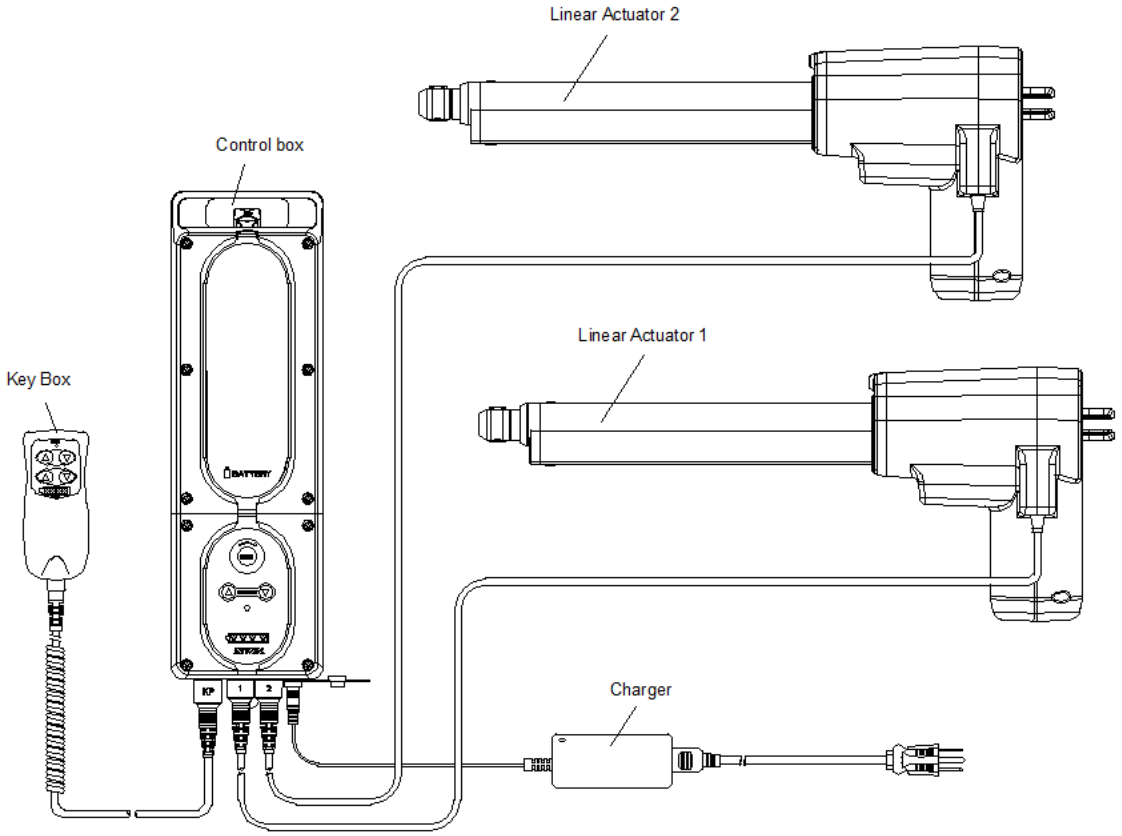


Figure 3.3.6.5

◆ LAK4D series (Take LAN5 as an example)

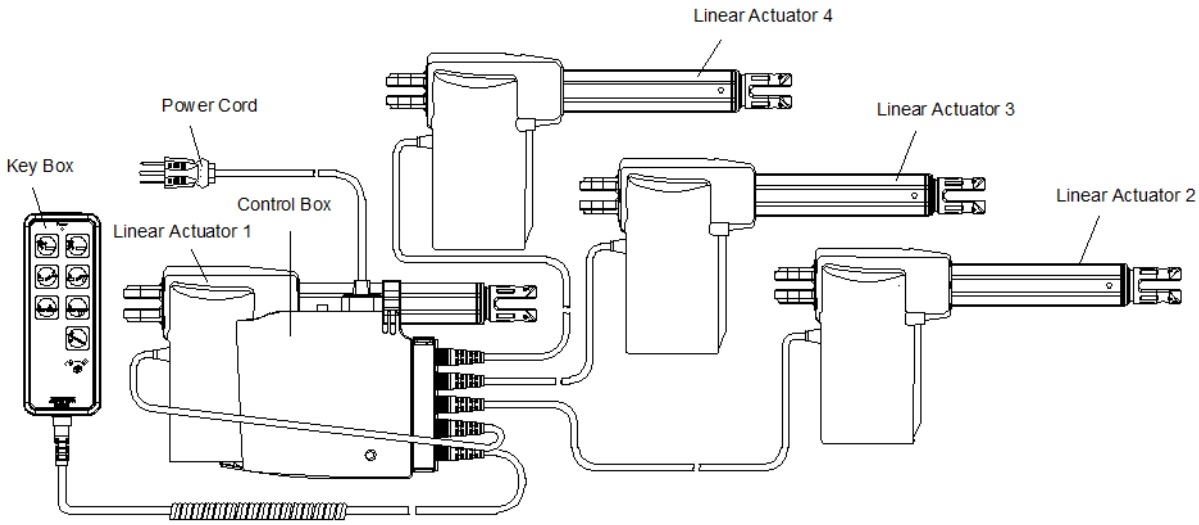


Figure 3.3.6.6

◆ LAK6B series (Take LAN3A / LAN5 as an example)

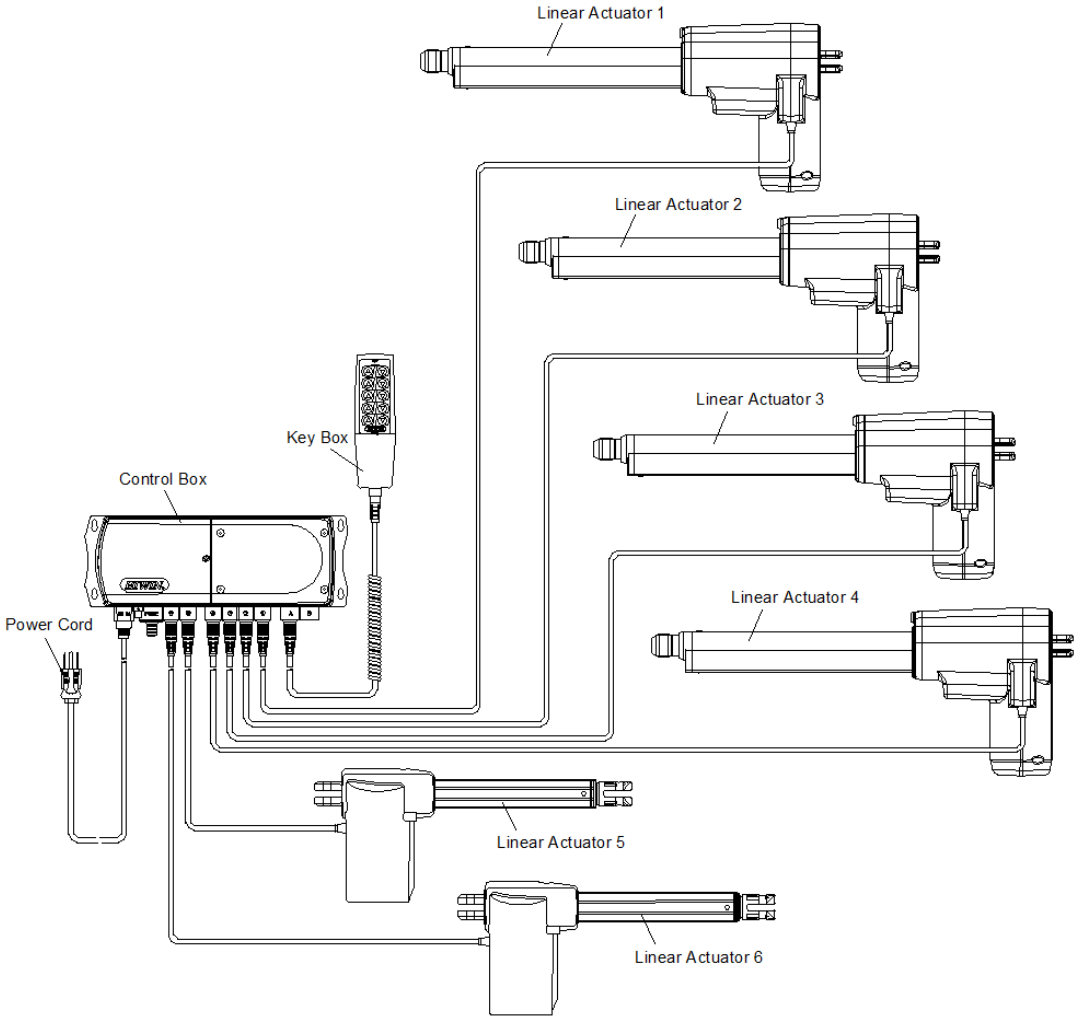


Figure 3.3.6.7

3.3.7 IP class description

The descriptions of IP (International Protection) class are as follows:

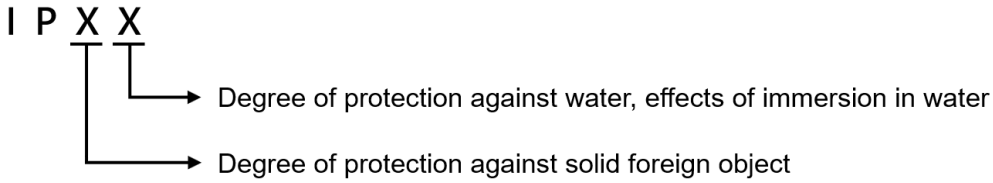


Figure 3.3.7.1

Table 3.3.7.1

IP Class			Description
IP	0	X	Not protected (dust)
	1	X	Protected against solid foreign objects of 50 mm diameter and greater
	2	X	Protected against solid foreign objects of 12 mm diameter and greater
	3	X	Protected against solid foreign objects of 2.5 mm diameter and greater
	4	X	Protected against solid foreign objects of 1 mm diameter and greater
	5	X	Dust protected
	6	X	Dust tight
	X	0	Not protected (humidity)
	X	1	Protected against vertically falling water drops
	X	2	Protected against vertically falling water drops when enclosure is toted up to 75°
	X	3	Protected against spraying water
	X	4	Protected against splashing water
	X	5	Protected against water jets
	X	6	Protected against powerful water jets
	X	7	Protected against the effects of temporary immersion in water
	X	8	Protected against the effect of continuous immersion in water

Examples: IP20, IP54, IP66

3.3.8 Product application (medical bed)

◆ Specifications

Table 3.3.8.1

	Controller	Controller (PSE)	Keypad
Type	LAK4D-DDDD-230-GE	LAK4D-XXXX-100-YE (140VA) LAK4D-XXXX-100-YE (185VA) LAK4D-XXXX-100-YE (216VA)	LAP4G-4-GE
Power (Vin)	AC 230 V	AC 100 V	--
Power (Vout)	DC 24 V	DC 24V	--
IP Class	54	--	54
Duty Cycle	10% (Max. 2 min On)	10% (Max. 2 min On)	--
Protection Class	Class II	0	

Table 3.3.8.2

	Linear Actuator		
Type	LAN5-41-1-405-24GE	LAN5-21-1-60-24GE	LAN5-21-1-110-24GE
Max. Thrust	3000 N (Motor = 3500 rpm)	6000 N	6000 N
Max. Holding	3400 N	6000 N	6000 N
Max. Speed	9.5 mm/s (Load = 0)	4.5 mm/s (Load = 0)	4.5 mm/s (Load = 0)
Stroke	405 mm	60 mm	110 mm
Power	24V, Max. 4 Amp	24V, Max. 4 Amp	24V, Max. 4 Amp
IP Class	54	54	54
Duty Cycle	10% (Max. 2 min On)	10% (Max. 2 min On)	10% (Max. 2 min On)
Function of Medical Bed	Adjust the horizontal height of the bed	(1) Adjust the back (2) Adjust the legs (3) Adjust the horizontal tilt angle of the bed	(1) Adjust the back (2) Adjust the legs (3) Adjust the horizontal tilt angle of the bed

⚠CAUTION

- ◆ The safe working load for medical bed is 2000 N.
- ◆ The estimated lifetime of medical bed is 5~10 years (the average of 5 times a day).
- ◆ Operating temperature: 5°C~40°C (41°F~104°F)
- ◆ The protection class of anti-shock: BF
- ◆ Storage and transmission temperature: -10°C~50°C
- ◆ The product cannot be used in chemical burdened and high electromagnetic field environment.
- ◆ Maximum weighted sound power level: 52 dB(A)

- If LAN5 (quick release function) is used with medical bed, pay attention to the location of wiring. Do not casually place the wiring, or users may accidentally touch it or be tripped by it.
- If something abnormal occurs when using LAN5 (quick release function), turn the power off first and immediately contact the manufacturer.

◆ Keypad description

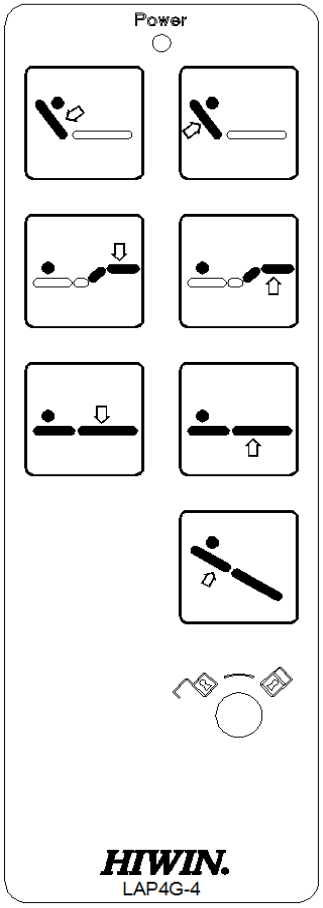
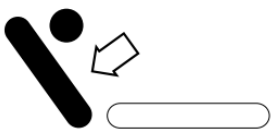
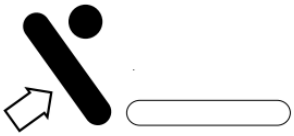
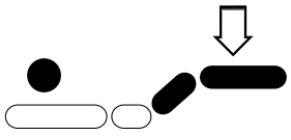
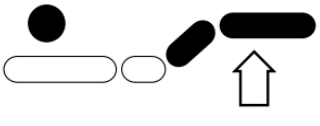
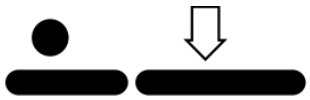
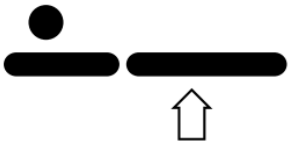
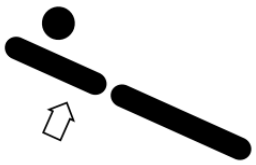


Figure 3.3.8.1

Table 3.3.8.3

Function: Adjust the angle of the back (Down) 	Function: Adjust the angle of the back (Up) 
Function: Adjust the angle of the legs (Down) 	Function: Adjust the angle of the legs (Up) 

Function: Adjust the horizontal height (Down) 	Function: Adjust the horizontal height (Up) 
	Function: Adjust the horizontal tilt angle of the bed 

◆ Cleaning and disinfecting

If the bed has visible contamination, it must be cleaned and disinfected. Use the disinfectants approved by DGHM (German Society for Hygiene and Microbiology). The checklist of product is as follows.

Table 3.3.8.4

Checklist of Product		Defect Description
Electrical components (Visual check)	☐Cable (Damaged) ☐Power cord (Damaged)	
Mechanical components (Visual check)	☐Controller (Damaged, Deformed) ☐Linear actuator (Damaged, Deformed) ☐Keypad (Damaged, Deformed) ☐Accessories ☐Tube-bolt (Damaged, Deformed) ☐Cord-bolt (Damaged, Deformed) ☐Bolt (Damaged, Deformed) ☐Key (Damaged, Deformed)	
Function test	☐Keypad ☐Keypad's knob ☐Linear actuator ☐Controller's LED light	
Signature of examiner:	Check result:	Date:

⚠CAUTION

◆ If any problem occurs, immediately contact the supplier.

4. Transport and setup

4.1 Delivery

4.1.1 Delivery state

The linear actuators are supplied fully assembled, function tested and ready for connection. To prevent damage arising during transport, the linear actuators are provided with transportation safety devices and shipping devices.

4.1.2 Scope of delivery

For the scope of delivery, please refer to the contractual documentation.

4.1.3 Delivery ambient conditions

Table 4.1.3.1

Environmental Parameter	Description
Air temperature	-10°C~50°C
Relative humidity	20~80%
Rate of change of temperature	0.5 °C/min
Condensation	Not allowed
Formation of ice	Not allowed
Delivery the linear actuator in an environment with good protection. (indoor / factory)	

Note:

1. Avoid exposing to direct sunlight.
2. Keep away from electromagnetic interference source sites, such as welding and discharge machines.

4.2 Transport to the installation site

⚠WARNING

Risk of personal injury.

- Lifting heavy loads may damage your health.
- For total load of package with linear actuator over 20 kg, use a hoist of an appropriate size when positioning heavy loads!
- Check applicable occupational health and safety regulations when handling suspended loads!

⚠CAUTION

Risk of damage to the linear actuator!

The linear actuator may be damaged by mechanical loading.

- No heavy load on the cover!
- During transport, do not put any additional loads on the linear actuator.

4.3 Requirements at the installation site

Table 4.3.1

Air temperature	0°C~50°C
Relative humidity	< 80%RH (non-condensing)
Altitude	< 1000m
Installation site	Flat, dry, vibration-free
Protection class	No interference from corrosive solvent or strong magnetic
Grounding	Plant power grounding line conforms to international requirements

Note:

1. Avoid exposing to direct sunlight.
2. Keep away from electromagnetic interference source sites, such as welding and discharge machines.

4.4 Storage

- Store the linear actuator in its transport packaging.
- Only store the linear actuator in dry, frost-free areas with a corrosion-free atmosphere.
- Clean and protect used linear actuator before storage.

Table 4.4.1

Environmental Parameter	Description
Air temperature	-10°C~50°C
Relative humidity	20~80%
Rate of change of temperature	0.5 °C/min
Condensation	Not allowed
Formation of ice	Not allowed
Store the linear actuator in an environment with good protection. (indoor / factory)	

4.5 Unpacking and setup

⚠CAUTION

Risk of damage to the linear actuator!

The linear actuator may be damaged by mechanical loading.

- No heavy load on the cover!
- During unpacking, do not put any additional loads on the linear actuator.

Note:

1. The linear actuator can only be unpacked indoors.
2. The linear actuator is provided with power cable and signal cable. During unpacking, the wiring of linear actuator must not be bent or pulled.
3. Carefully handle the wiring of linear actuator. Do not bend or pull it.
4. Ensure the appearance and specific label on linear actuator match the catalog.
5. Dispose of packaging in an environmentally friendly way.

5. Assembly and connection

5.1 Mechanical installation

5.1.1 Linear actuator installation

The installation steps are as follows:

1. Please ensure that the extrusion tube is at the lowest position before installing linear actuator.
2. Please first select appropriate fixing positions for two ends of the linear actuator according to the selected linear actuator stroke, so that the linear actuator meets the design requirements when it moves back and forth. The two selected fixing positions according to this principle cannot be blocked by other mechanisms to cause interference when the linear actuator moves.
3. Install the brackets on the selected fixing positions.
4. Use fixing pins to connect brackets mentioned in step 2 and two ends of the linear actuator. Notice that the connection should not be tight fit between pins and ends of the linear actuator, so that the fit is loose enough to make linear actuator rotate. During the static or dynamic operation of the linear actuator, the fit mentioned above should not be loose.
5. If the linear actuator movement is on a horizontal surface, keep its body horizontal during installation. If the linear actuator movement is on a vertical surface, keep its body vertical during installation. If the principle is not followed, the linear actuator may be blocked during operation and become damaged.
6. After fixing the linear actuator, test with non-continuous power on (manually) to make linear actuator move back and forth to check whether the process meets the design requirements and whether the motor stops operating when the linear actuator moves to the maximum and minimum strokes on the installation design. If the linear actuator cannot meet the design requirements or the motor fails to stop operating, please repeat the steps 2~4. The installation procedure is completed if it meets the steps above.
7. HIWIN MIKROSYSTEM is not responsible for any damage, accident or injury caused by failure in following the installation principle.

⚠CAUTION

- Do not instantaneously change the current direction when using this product. That is, if the extrusion tube of linear actuator is moving forward, stop the motor and apply the reverse current to make it move backward. The same goes for the opposite direction.
- Do not use this product with a radial load (refer to the figures and tables below.) because the linear actuator more appropriately applies to take the axial load. If there is product damage, accident or personal injury caused by improper load, HIWIN MIKROSYSTEM will not take any legal responsibility.

- Built-in limit switch: The “lowest position” is the position where the linear actuator is supplied with

voltage and the extrusion tube can no longer move inward.
(Take LAS1 as an example, refer to the figure below.)

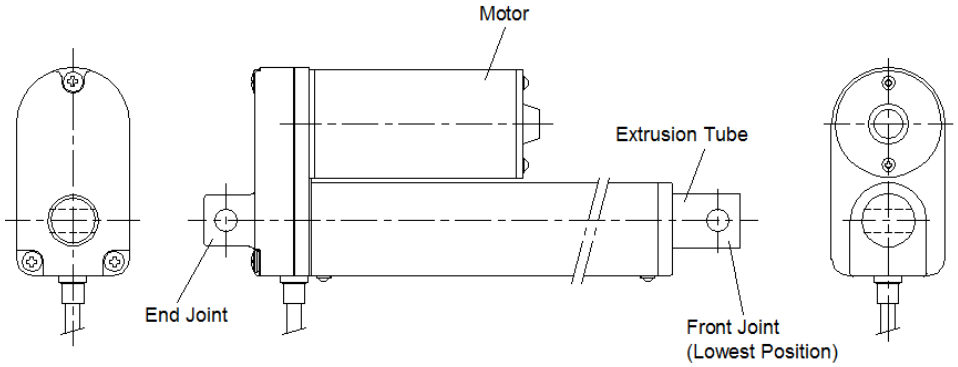


Figure 5.1.1.1

- External limit switch: For the linear actuator with external limit switch, ensure the extrusion tube is at the lower limit position before installation.
  (Take LAM1 as an example, refer to the figure below.)

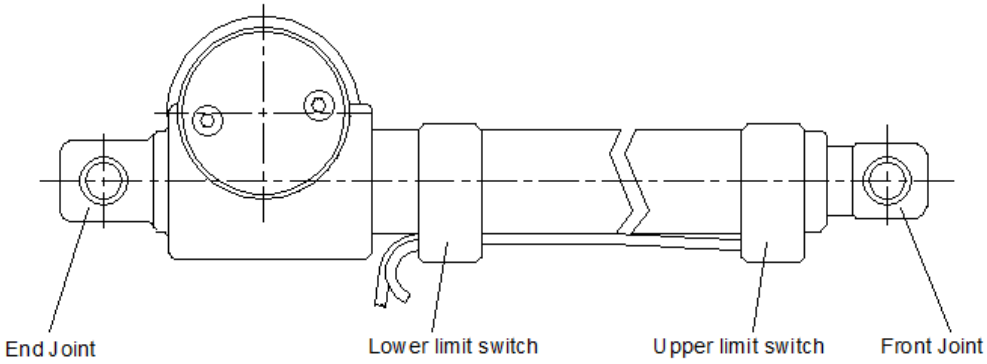


Figure 5.1.1.2

⚠CAUTION

- If the linear actuator doesn't have external limit switch installed, users must install the stroke limits on the linear actuator themselves. The distance between two limits cannot be longer than the stroke of linear actuator. Then, rotate the extrusion tube to adjust the length of linear actuator, which can meet the minimum requirements for installation.
- To avoid any wrong movements, there shouldn't have any magnetic materials close to the external limit switch within 30 mm.

◆ Installation position of LAC1

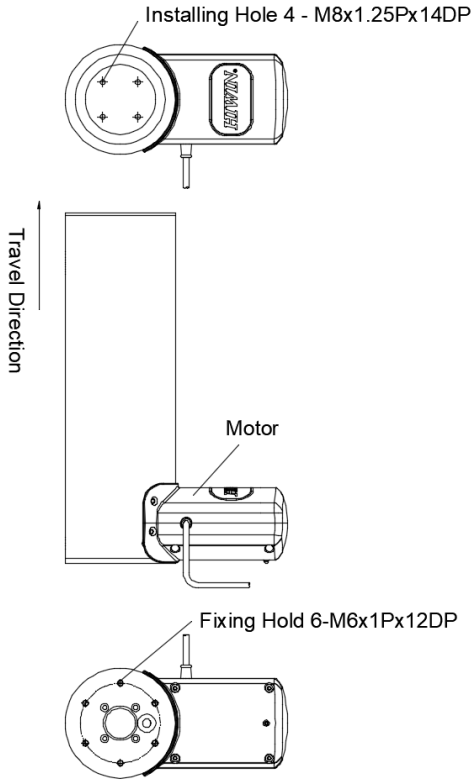


Figure 5.1.1.3

5.1.2 Lateral force description

◆ LA series

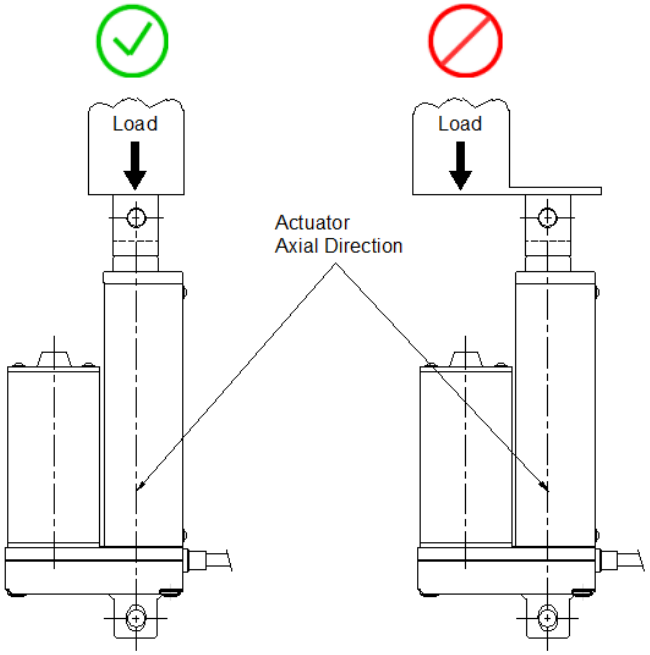


Figure 5.1.2.1

◆ LAC1 series

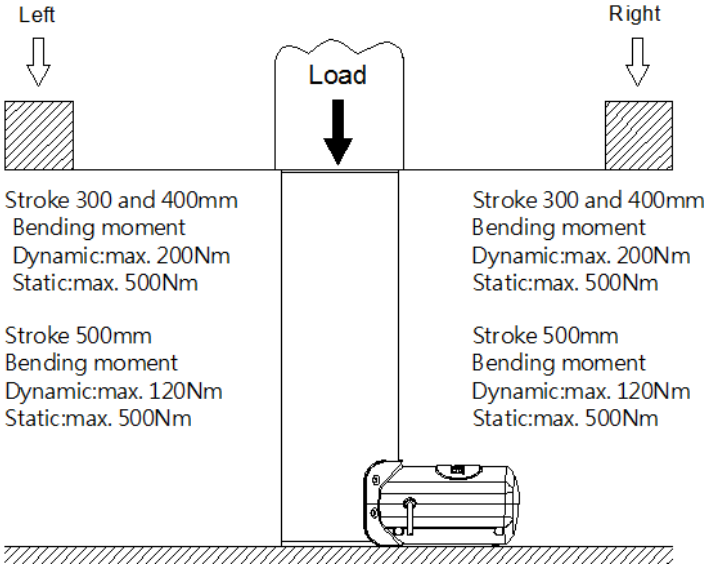


Figure 5.1.2.2

5.1.3 Quick release description

◆ LAN3A series

1. To avoid accidental contact, put warning notice on the mechanisms or lifters.
2. The way to activate quick release function is to pull the tab and let the tab extend, as the direction shown in the figure below.
3. When the speed of quick release is too fast, adjust the extending length of the tab immediately; the screw beside the tab can adjust and limit the maximum extending length of the tab.
4. Quick release function for LAN3A series can only be used in vertical pushing force condition. It cannot be used in pulling force or slopping force conditions.

◆ LAN5 series

1. When installing, ensure the cable is at the state of natural stretching without bending, and the end of the wire is firmly fixed on the handle of mechanisms or medical beds.
2. To avoid accidental contact, put warning notice on the mechanisms or medical beds.
3. The way to activate quick release function is to pull the handle and let the wire extend, as the direction shown in the figure below.
4. Temporarily lift the load on linear actuator before activating quick release function. Thus, users can pull the wire out and separate the clutch mechanism.
5. Keep the clutch mechanism separated and put the load back on linear actuator. The load can extend or retract along axis direction.
6. The load cannot be the operation staff himself.
7. After quick release function is activated, ensure the handle and the clutch mechanism are restored by extending and retracting the linear actuator.
8. Refer to the installation guide to fix the extrusion tube of linear actuator on one guiding mechanism. If it is not fixed on any mechanism, it could idle.

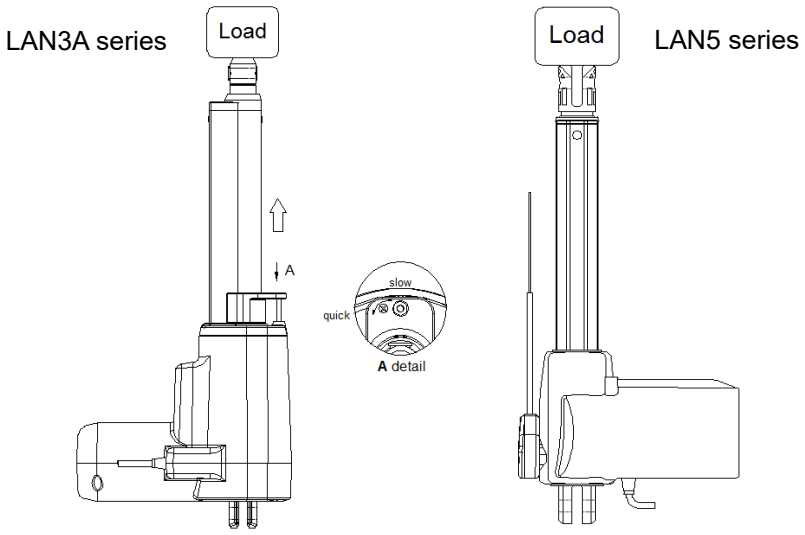


Figure 5.1.3.1

5.1.4 Controller installation

◆ Installation methods of LAK2

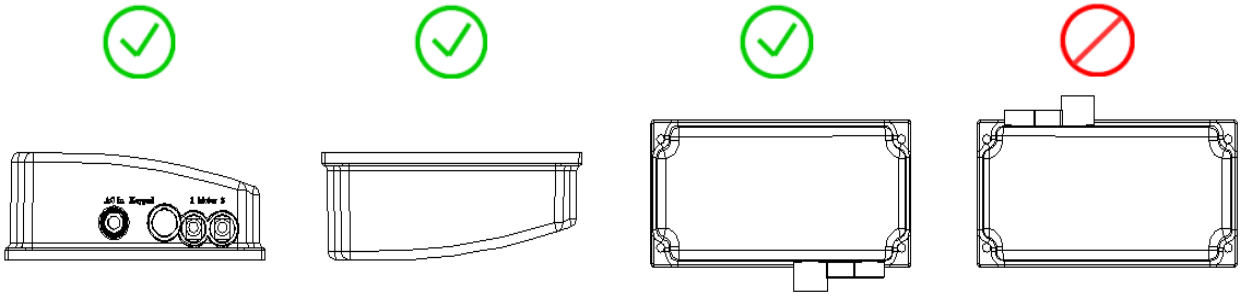


Figure 5.1.4.1

◆ Installation steps of LAK2J

1. Before assembling, ensure the EMERGENCY switch is pressed during the whole assembly.
2. Pull the slider (A), uplift the battery box, and loosen the screws (B).
3. Lightly lift the cover of battery box so that it can be separated from the support and the controller (①).
4. Install the support at the desired position, and fix it on point C with screws (②).
5. Before reinstalling the cover of battery box on the support, lightly tighten the screws (B). By doing so, the cover of battery box will not shake after it is embedded in the whole device (③).
6. Buckle the slider (A) and ensure it is completely and firmly installed on the whole device (④).
7. Finally, turn the EMERGENCY switch clockwise so that the controller can start the operation.

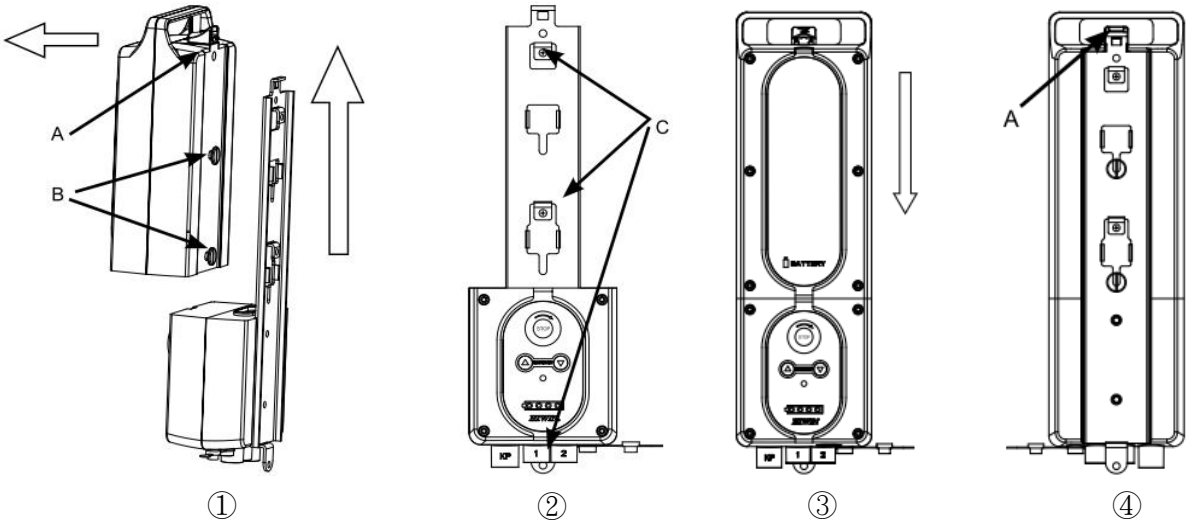


Figure 5.1.4.2

◆ Installation steps of LAM3 and LAK2D

Align the bolt on LAK2D controller with the notch on LAM3 and insert it. Lock one 3/16”*15 screw to the place circled in the figure below to fix the linear actuator and controller.

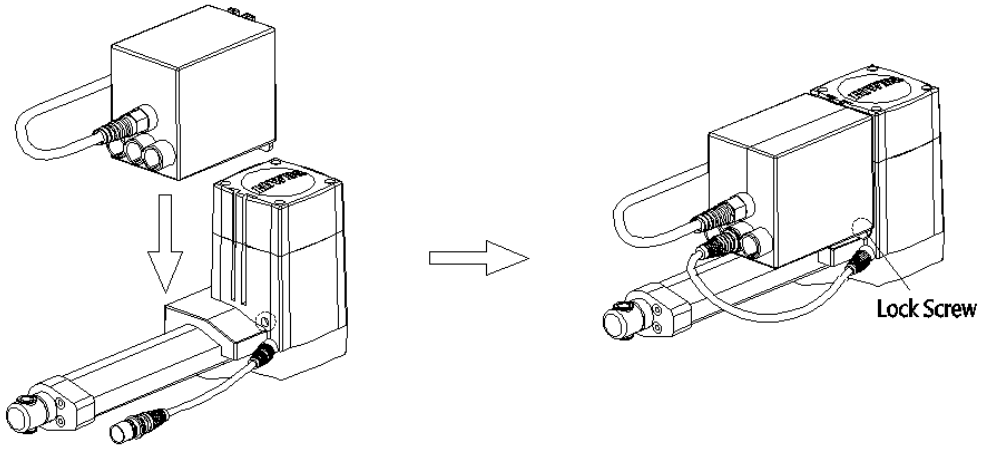


Figure 5.1.4.3

◆ Installation steps of LAN5 and LAK4D

Align the bolt on LAK4D controller with the notch on LAN5 and insert it. Buckle the tube-bolt to fix the linear actuator and controller.

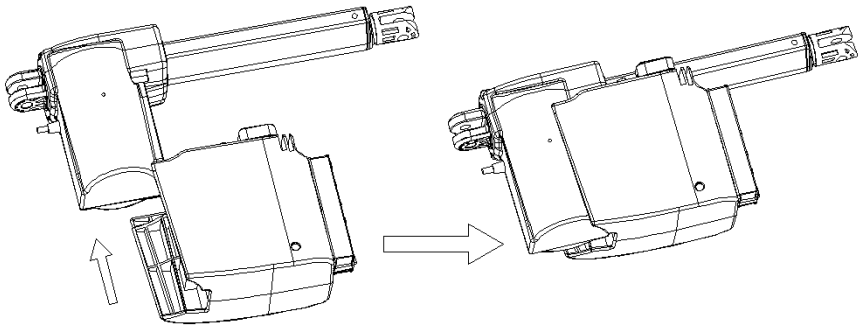


Figure 5.1.4.4

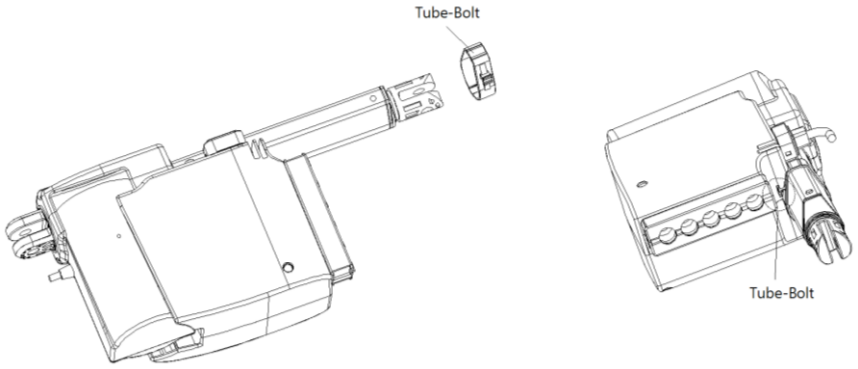


Figure 5.1.4.5

◆ Installation steps of LAK4D fixer

After inserting the connectors of linear actuator and keypad, vertically buckle the upper fixer and lower fixer (A) on LAK4D controller according to the arrow direction. Plug in the main power cable (B) and buckle the power cable fixer according to the arrow direction.

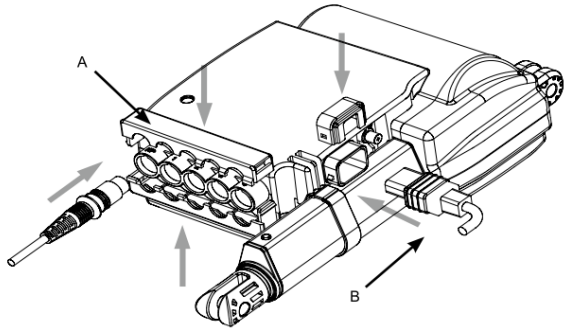


Figure 5.1.4.6

◆ Disassembly steps of LAK4D fixer

1. Use a tool to press the fixer (C) on LAK4D controller to release one side of the fixer.

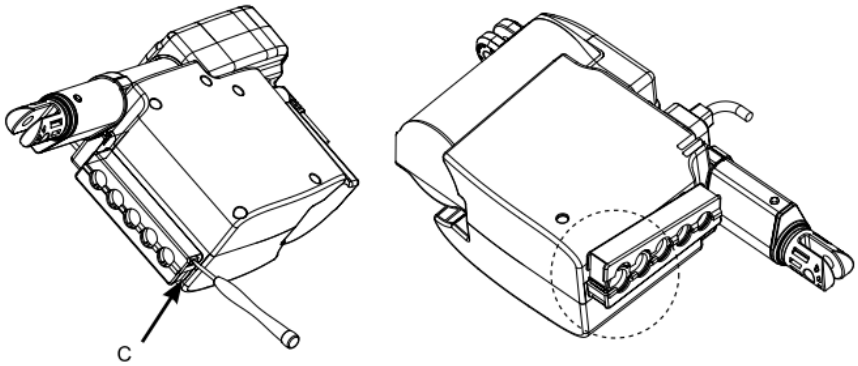


Figure 5.1.4.7

2. Use a screwdriver to prize the bottom (D) of power cable fixer on LAK4D controller.

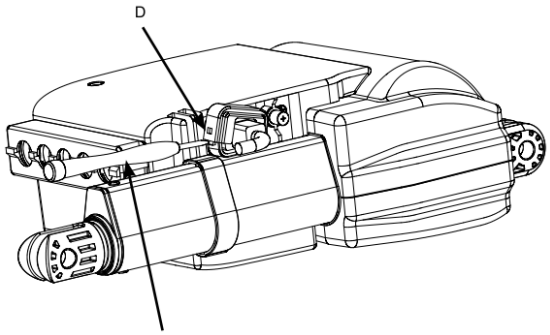


Figure 5.1.4.8

◆ Installation steps of LAFS pedal switch

The pedal switch can be directly placed on the ground. Do not stamp on the two pedals simultaneously. Besides, there is a powerful magnet attached on the back of pedal switch. Users can attach it on the surface of iron metal for convenient movement.

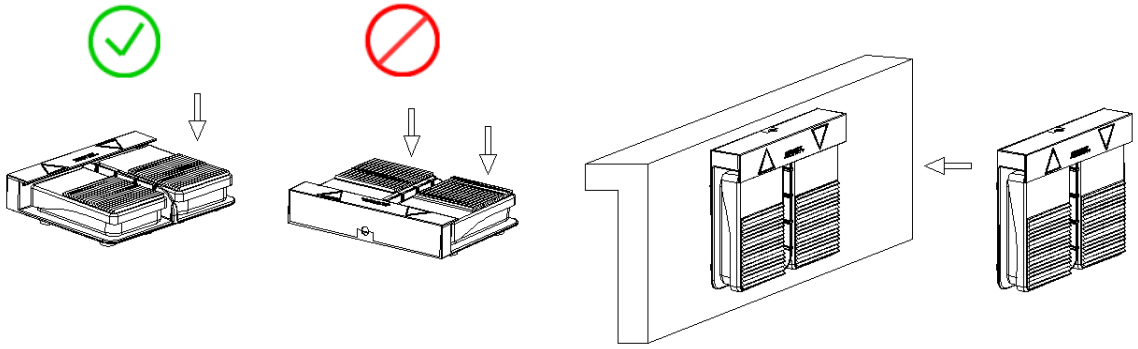


Figure 5.1.4.9

⚠CAUTION
◆ Do not stamp on the two pedals simultaneously.

5.2 Electrical installation

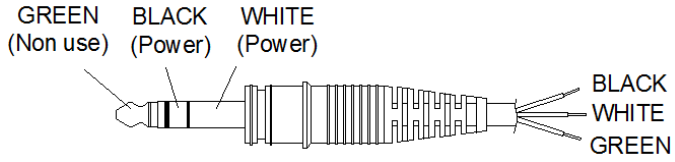
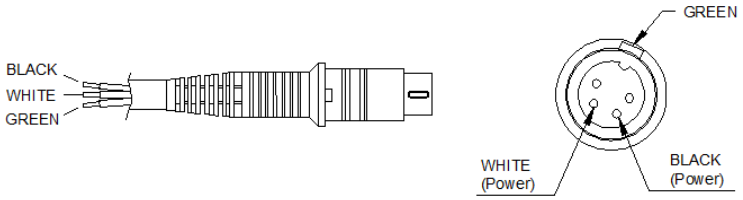
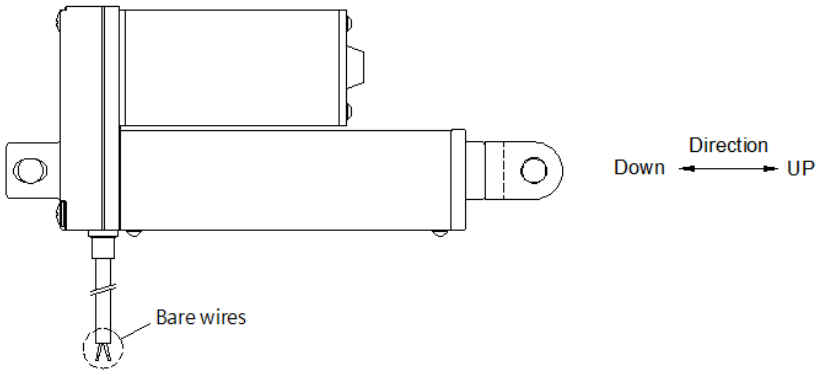
5.2.1 Power wiring of linear actuator

Table 5.2.1.1

Model	Power Polarity	Power Cable		
		Audio Connector	DIN 4 PIN	Bare Wire
LAM1	+	WHITE	BLACK	BLACK
	-	BLACK	WHITE	WHITE
		GREEN	GREEN	
LAM2	+	WHITE	BLACK	BLACK
	-	BLACK	WHITE	WHITE
	GND	GREEN	GREEN	
LAM3	+	WHITE	BLACK	BLACK
	-	BLACK	WHITE	WHITE
	GND	GREEN	GREEN	
LAS1	+	WHITE	BLACK	WHITE
	-	BLACK	WHITE	BLACK
		GREEN	GREEN	
LAS2	+	WHITE	BLACK	WHITE
	-	BLACK	WHITE	BLACK
		GREEN	GREEN	
LAS3	+	WHITE	BLACK	WHITE
	-	BLACK	WHITE	BLACK
		GREEN	GREEN	
LAS4	+	WHITE	BLACK	WHITE
	-	BLACK	WHITE	BLACK
		GREEN	GREEN	
LAN1	+	WHITE	BLACK	BLACK
	-	BLACK	WHITE	WHITE
	GND	GREEN	GREEN	GREEN
LAN3A	+	WHITE	BLACK	BLACK
	-	BLACK	WHITE	WHITE
	GND	GREEN	GREEN	GREEN
LAN4	+	WHITE	BLACK	WHITE
	-	BLACK	WHITE	BLACK
	GND	GREEN	GREEN	GREEN
LAN5	+	WHITE	BLACK	BLACK
	-	BLACK	WHITE	WHITE
	GND	GREEN	GREEN	GREEN

Model	Power Polarity	Power Cable		
		Audio Connector	DIN 4 PIN	Bare Wire
LAC1	+	WHITE	BLACK	BLACK
	-	BLACK	WHITE	WHITE
	GND	GREEN	GREEN	GREEN

Table 5.2.1.2

Connector Type		Diagram
Power Cable	Audio Connector	
	DIN 4 PIN	
	Bare Wire	

⚠CAUTION

- Do not connect main power cable before the whole system is completely connected.

◆ Connector installation of linear actuator and controller

Before inserting the connector of linear actuator to the chassis of controller, please ensure the connector bolt aligns with the housing notch. To ensure the IP protection class of the whole system, push the connector into the bottom of chassis until there is no gap between the connector and the housing (connector installation of keypad and controller is the same as above mentioned).

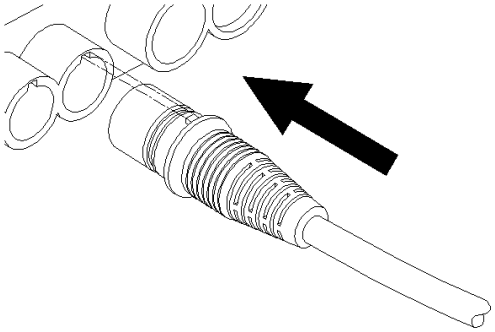


Figure 5.2.1.1

5.2.2 Reed switch

◆ Feature

Common-open type (standard): with red LED display

Table 5.2.2.1

No	Feature	Specification
1	Operation Voltage	DC 10~30V
2	Operating Temperature	-10°C~70°C
3	Storage Temperature	-20°C~80°C
4	Operation Current	100mA (max)
5	Protection Class	IP67
6	Switching Frequency	900Hz
7	Signal Cable	Φ2.8, 2C

Common-close type (optional)

Table 5.2.2.2

No	Feature	Specification
1	Operation Voltage	DC 10~30V
2	Operating Temperature	-10°C~70°C

No	Feature	Specification
3	Storage Temperature	-20°C~80°C
4	Operation Current	100mA (max)
5	Protection Class	IP67
6	Switching Frequency	900Hz
7	Signal Cable	Φ2.8, 2C

◆ Circuit diagram

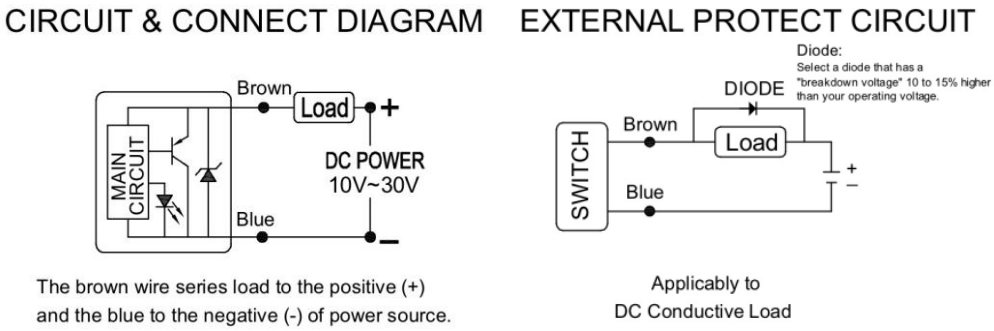


Figure 5.2.2.1

⚠CAUTION

- ◆ When using reed switch, pay attention to the operation voltage and current. Operation current cannot exceed 100mA.
- ◆ When using reed switch, limiting resistor is required.
- ◆ The calculation of limiting resistor: R=V/I, R=Limiting resistor, V=Input voltage, I=Maximum current (0.1A=100mA).
- ◆ The limiting resistor used must be greater than or equal to the calculated value.
- ◆ To avoid voltage instability causing the actual current to exceed the maximum current (100mA), please reserve a safe value when using it. The recommendations are as follows:

Input Voltage (V)	Limiting Resistor (Ω)	Estimated Current	Recommended Resistor Specifications (W)
12	470	24~30mA	2W
24	1k		

5.2.3 Control mode of external limit switch

◆ Low-level control (Take PLC as an example)

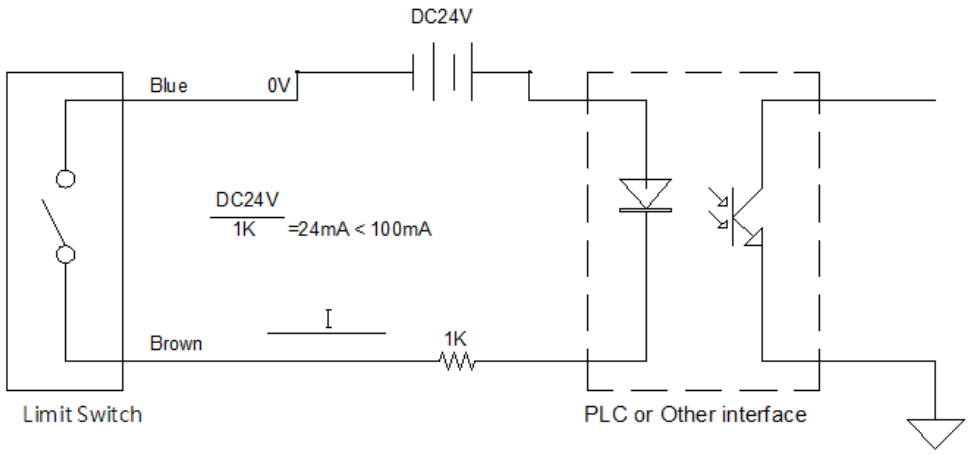


Figure 5.2.3.1

◆ High-level control (Take PLC as an example)

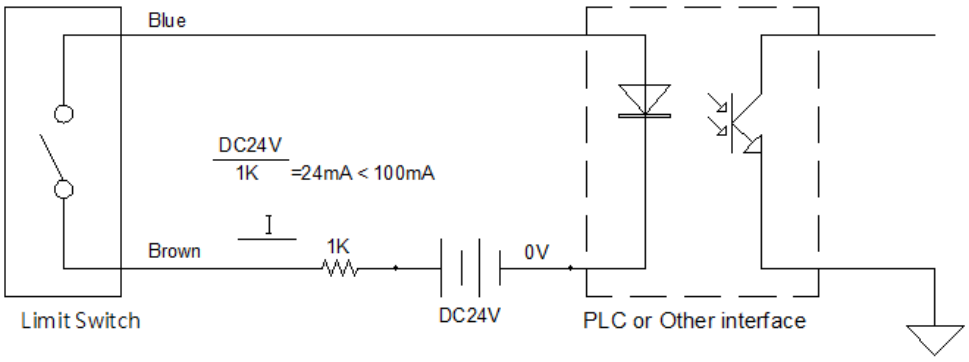


Figure 5.2.3.2

5.2.4 Wiring of position feedback

◆ LAS2, LAS3 position feedback (Hall sensor and Potentiometer)

Bare wire for Hall sensor

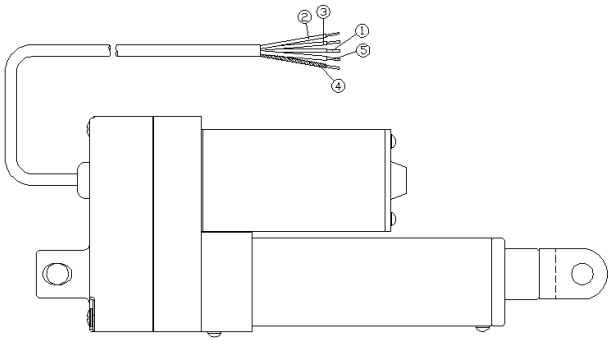


Figure 5.2.4.1

Table 5.2.4.1

WIRING	COLOR	REMARK
1	BLUE	GND
2	YELLOW	OUTPUT
3	RED	24/12VDC
4	BLACK	MOTOR(-)
5	WHITE	MOTOR(+)

DIN 4 PIN connector for Hall sensor

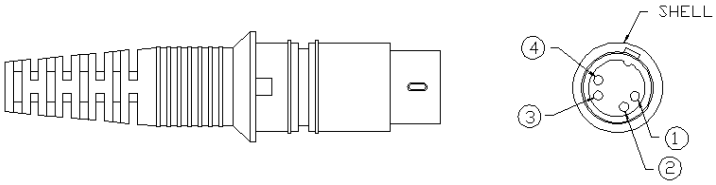


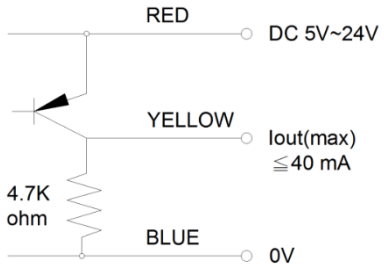
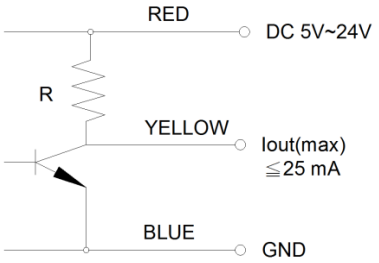
Figure 5.2.4.2

Table 5.2.4.2

DIN	COLOR	REMARK
1	YELLOW	OUTPUT
2	BLACK	MOTOR(+)
3	WHITE	MOTOR(-)
4	RED	24/12VDC
SHELL	BLUE	GND

Hall sensor specification

Table 5.2.4.3

Specification	Input Voltage	Circuit Diagram
Output	High-level 24/12VDC Low-level 0.2V/10mA sink (PNP)	
	High-level 24/12VDC Low-level 0.2V/10mA sink (NPN)	
	5VDC TTL	--

Bare wire for Potentiometer

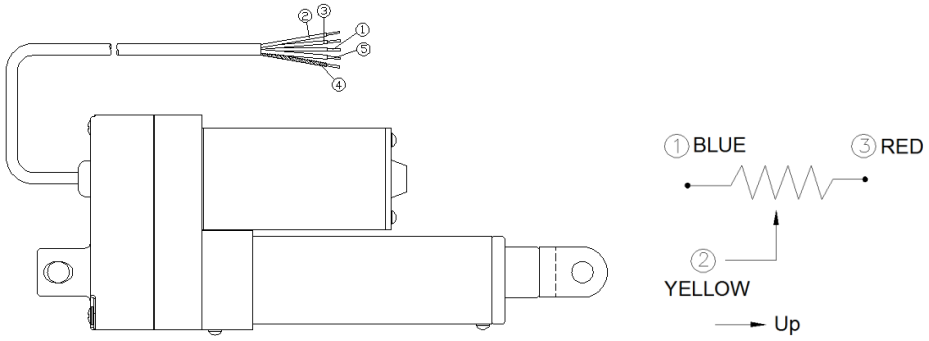


Figure 5.2.4.3

Table 5.2.4.4

WIRING	COLOR	REMARK
1	BLUE	GND ①
2	YELLOW	OUTPUT ②
3	RED	24/12VDC ③
4	BLACK	MOTOR(-)
5	WHITE	MOTOR(+)

DIN 4 PIN connector for Potentiometer

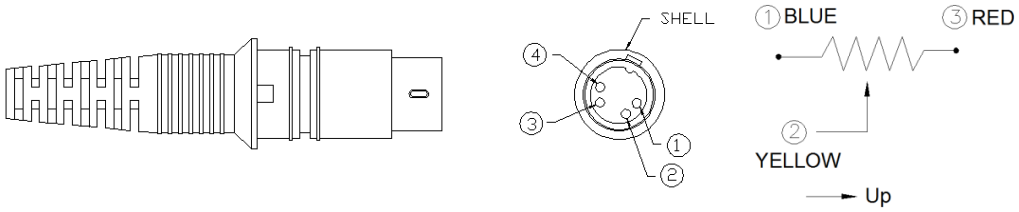


Figure 5.2.4.4

Table 5.2.4.5

DIN	COLOR	REMARK
1	BLUE	GND ①
2	BLACK	MOTOR(+)
3	WHITE	MOTOR(-)
4	RED	24/12VDC ③
SHELL	YELLOW	OUTPUT ②

◆ LAM2 position feedback (MR sensor)

Bare wire for MR sensor

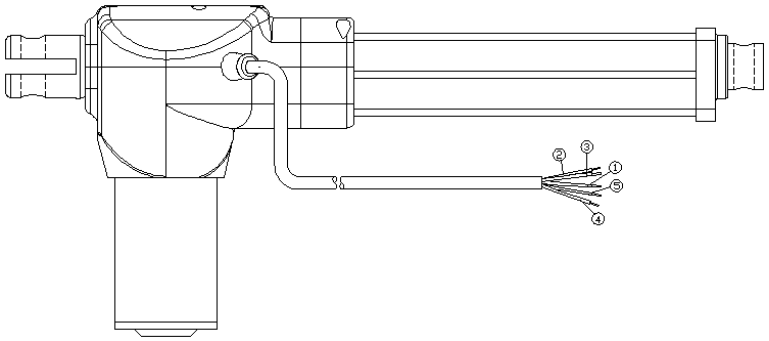


Figure 5.2.4.5

Table 5.2.4.6

WIRING	COLOR	REMARK
1	GREEN	GND
2	YELLOW	OUTPUT
3	RED	24/12VDC
4	BLACK	MOTOR(+)
5	WHITE	MOTOR(-)

DIN 4 PIN connector for MR sensor

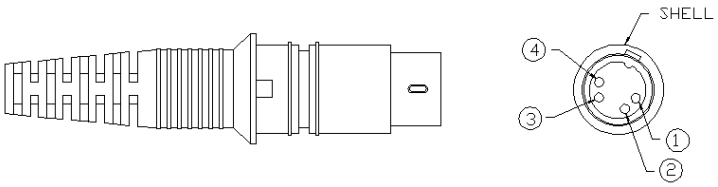


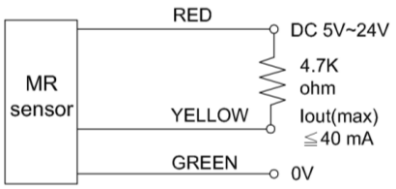
Figure 5.2.4.6

Table 5.2.4.7

DIN	COLOR	REMARK
1	YELLOW	OUTPUT
2	BLACK	MOTOR(+)
3	WHITE	MOTOR(-)
4	RED	24/12VDC
SHELL	GREEN	GND

MR sensor specification

Table 5.2.4.8

Specification	Input Voltage	Circuit Diagram
Output	DC 5V~24V	

◆ LAN1 position feedback (Hall sensor)

Bare wire for Hall sensor

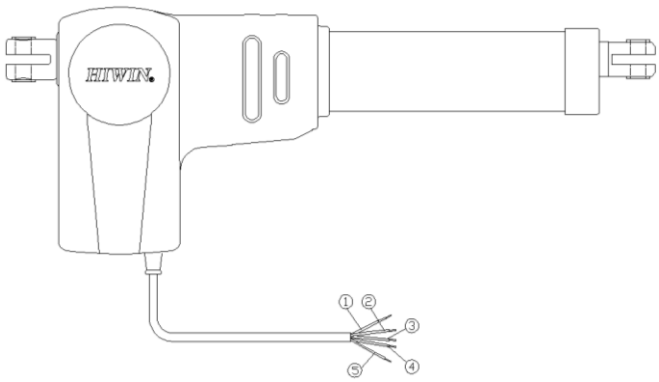


Figure 5.2.4.7

Table 5.2.4.9

WIRING	COLOR	REMARK
1	GREEN	GND
2	YELLOW	OUTPUT
3	RED	12VDC
4	BLACK	MOTOR(+)
5	WHITE	MOTOR(-)

DIN 4 PIN connector for Hall sensor

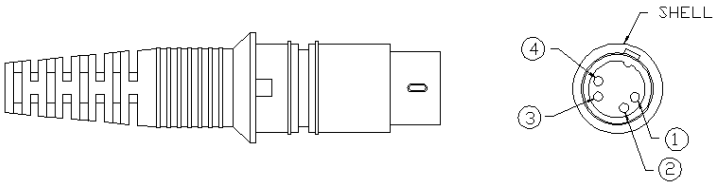


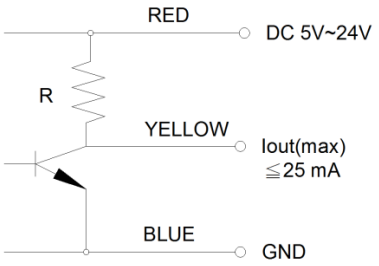
Figure 5.2.4.8

Table 5.2.4.10

DIN	COLOR	REMARK
1	YELLOW	OUTPUT
2	BLACK	MOTOR(+)
3	WHITE	MOTOR(-)
4	RED	12VDC
SHELL	GREEN	GND

Hall sensor specification

Table 5.2.4.11

Specification	Input Voltage	Circuit Diagram
Output	High-level 12VDC Low-level 0.2V/10mA sink (NPN)	
	5VDC TTL	--

◆ LAN3A position feedback (Potentiometer and MR sensor)

Bare wire for Potentiometer

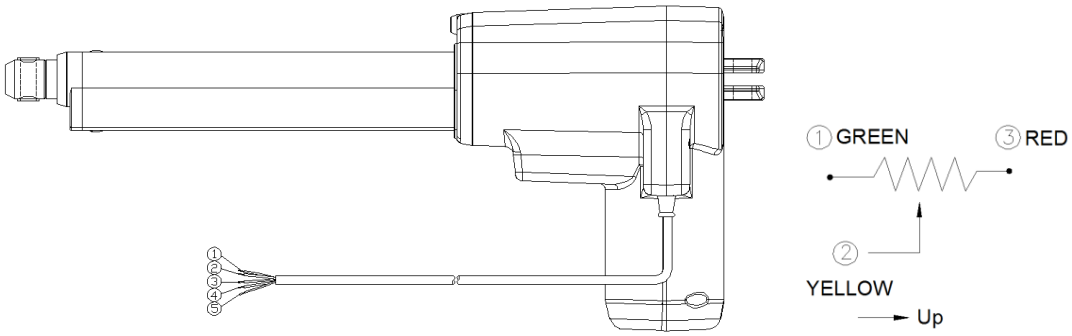


Figure 5.2.4.9

Table 5.2.4.12

WIRING	COLOR	REMARK
1	GREEN	GND ①
2	YELLOW	OUTPUT ②
3	RED	24VDC ③
4	BLACK	MOTOR(-)
5	WHITE	MOTOR(+)

DIN 4 PIN connector for Potentiometer

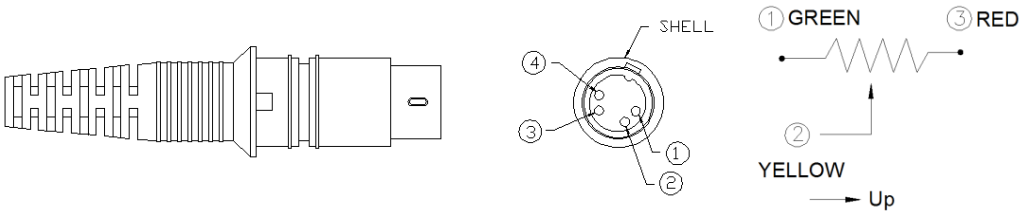


Figure 5.2.4.10

Table 5.2.4.13

DIN	COLOR	REMARK
1	YELLOW	OUTPUT ②
2	BLACK	MOTOR(+)
3	WHITE	MOTOR(-)
4	RED	24VDC ③
SHELL	GREEN	GND ①

Bare wire for MR sensor

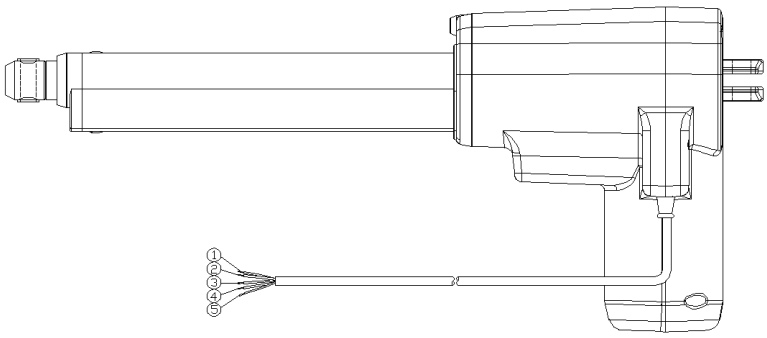


Figure 5.2.4.11

Table 5.2.4.14

WIRING	COLOR	REMARK
1	GREEN	GND
2	YELLOW	OUTPUT
3	RED	24VDC
4	BLACK	MOTOR(-)
5	WHITE	MOTOR(+)

DIN 4 PIN connector for MR sensor

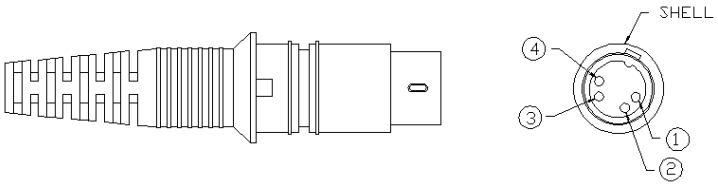


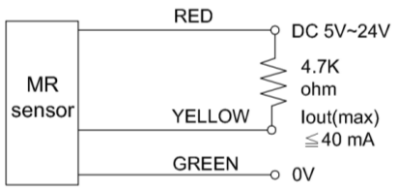
Figure 5.2.4.12

Table 5.2.4.15

DIN	COLOR	REMARK
1	YELLOW	OUTPUT
2	BLACK	MOTOR(+)
3	WHITE	MOTOR(-)
4	RED	24VDC
SHELL	GREEN	GND

MR sensor specification

Table 5.2.4.16

Specification	Input Voltage	Circuit Diagram
Output	DC 5V~24V	

◆ LAN5 position feedback (Hall sensor)

Bare wire for Hall sensor

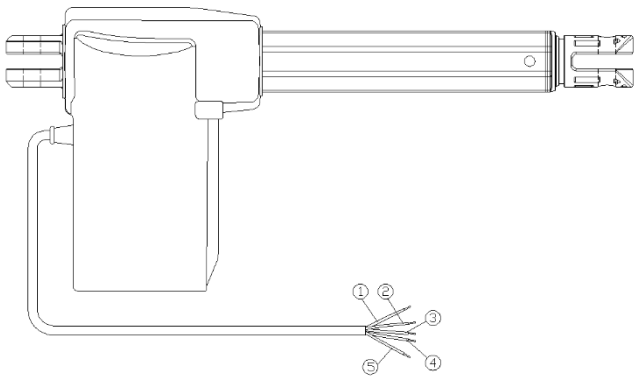


Figure 5.2.4.13

Table 5.2.4.17

DIN	COLOR	REMARK
1	GREEN	GND
2	YELLOW	OUTPUT
3	RED	24VDC
4	BLACK	MOTOR(+)
5	WHITE	MOTOR(-)

DIN 4 PIN connector for Hall sensor

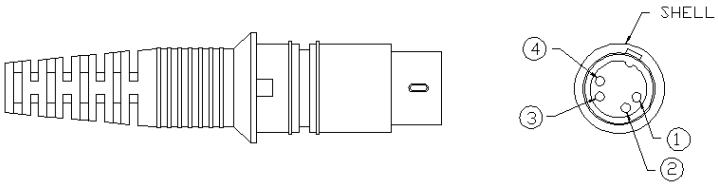


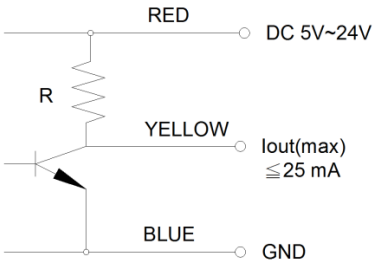
Figure 5.2.4.14

Table 5.2.4.18

DIN	COLOR	REMARK
1	YELLOW	OUTPUT
2	BLACK	MOTOR(+)
3	WHITE	MOTOR(-)
4	RED	24VDC
SHELL	GREEN	GND

Hall sensor specification

Table 5.2.4.19

Specification	Input Voltage	Circuit Diagram
Output	High-level 24VDC Low-level 0.2V/10mA sink (NPN)	
	5VDC TTL	--

◆ LAC1 position feedback (Hall sensor and Potentiometer)

Bare wire for Hall sensor

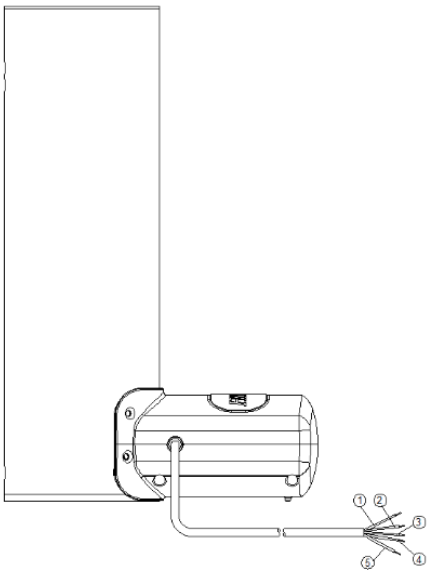


Figure 5.2.4.15

Table 5.2.4.20

DIN	COLOR	REMARK
1	GREEN	GND
2	YELLOW	OUTPUT
3	RED	24VDC
4	BLACK	MOTOR(+)
5	WHITE	MOTOR(-)

DIN 4 PIN connector for Hall sensor

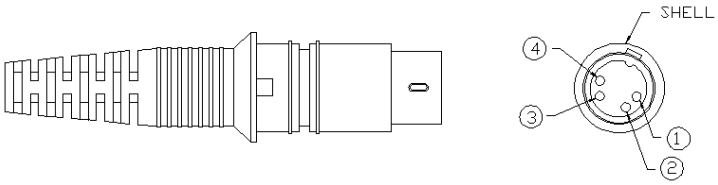


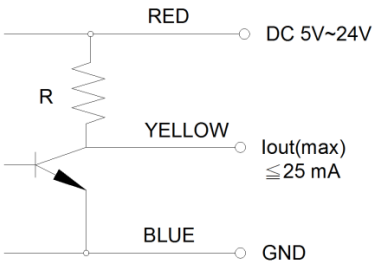
Figure 5.2.4.16

Table 5.2.4.21

DIN	COLOR	REMARK
1	YELLOW	OUTPUT
2	BLACK	MOTOR(+)
3	WHITE	MOTOR(-)
4	RED	24VDC
SHELL	GREEN	GND

Hall sensor specification

Table 5.2.4.22

Specification	Input Voltage	Circuit Diagram
Output	High-level 24VDC Low-level 0.2V/10mA sink (NPN)	
	5VDC TTL	--

Bare wire for Potentiometer

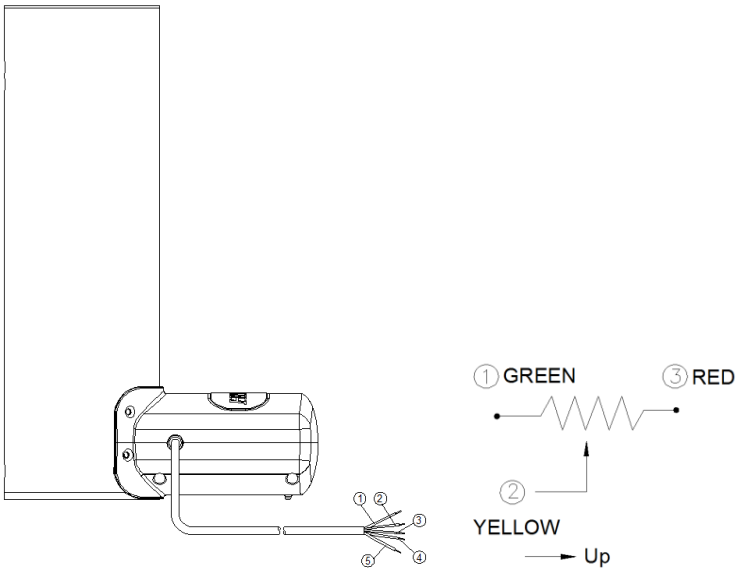


Figure 5.2.4.17

Table 5.2.4.23

DIN	COLOR	REMARK
1	GREEN	GND ①
2	YELLOW	OUTPUT ②
3	RED	24VDC ③
4	BLACK	MOTOR(+)
5	WHITE	MOTOR(-)

DIN 4 PIN connector for Potentiometer

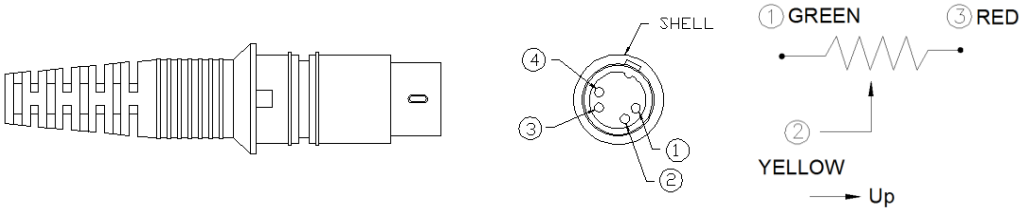


Figure 5.2.4.18

Table 5.2.4.24

DIN	COLOR	REMARK
1	YELLOW	OUTPUT ②
2	BLACK	MOTOR(+)
3	WHITE	MOTOR(-)

DIN	COLOR	REMARK
4	RED	24VDC ③
SHELL	GREEN	GND ①

5.2.5 Wiring of LAK / LAP series

◆ LAP1 / LAP2 wiring

LAP1 / LAP2 for LAK2 / LAK2D circuit diagram

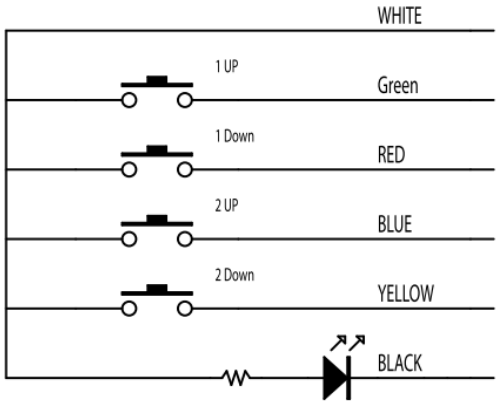


Figure 5.2.5.1

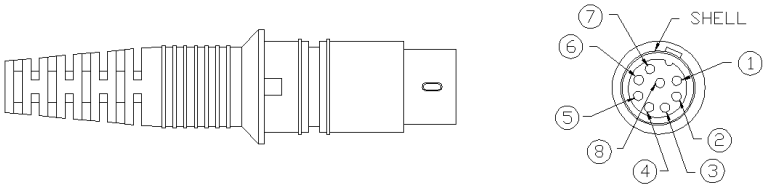


Figure 5.2.5.2

Table 5.2.5.1

DIN	WIRING	LAK2 / LAK2D	Specification
1	WHITE	DC_12V	220mA
2	BLACK	GND	50mA
3	No Used	No Used	--
4	No Used	No Used	--
5	GREEN	Axis 1 UP	50mA
6	BLUE	Axis 2 UP	50mA
7	YELLOW	Axis 2 DOWN	50mA

DIN	WIRING	LAK2 / LAK2D	Specification
8	RED	Axis 1 DOWN	50mA
SHELL	SHELL	No Used	--

LAP1 / LAP2 for LAK2LN circuit diagram

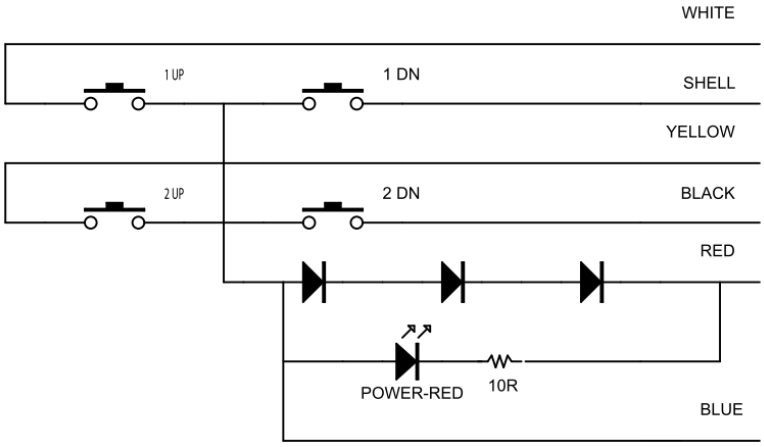


Figure 5.2.5.3

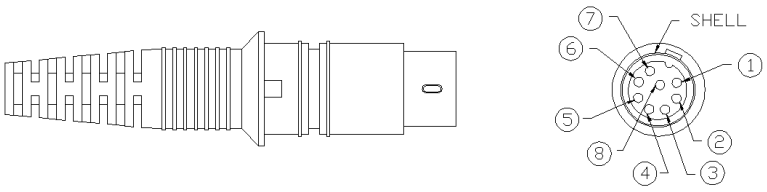


Figure 5.2.5.4

Table 5.2.5.2

DIN	WIRING	LAK2LN	Specification
1	WHITE	Axis 1 UP	50mA
2	BLACK	Axis 2 DOWN	50mA
3	YELLOW	Axis 2 UP	50mA
4	No Used	No Used	--
5	No Used	No Used	--
6	BLUE	No Used	--
7	No Used	No Used	--
8	RED	GND	--
SHELL	SHELL	Axis 1 DOWN	50mA

◆ LAP3 wiring

LAP3 for LAK2J circuit diagram

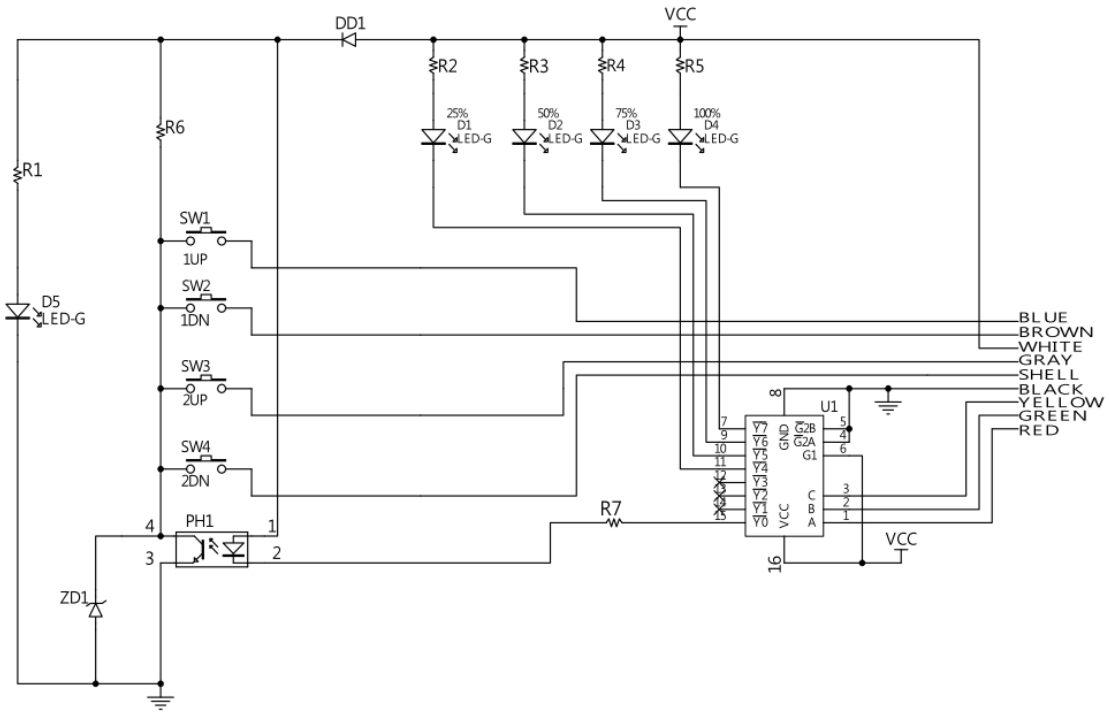


Figure 5.2.5.5

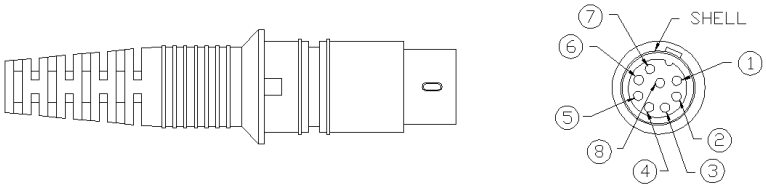


Figure 5.2.5.6

Table 5.2.5.3

DIN	WIRING	LAK2J	Specification
1	GRAY	Axis 2 UP	50mA
2	BLACK	GND	--
3	WHITE	VCC	220mA
4	YELLOW	Address C	50mA
5	GREEN	Address B	50mA
6	BLUE	Axis 1 UP	50mA
7	BROWN	Axis 1 DOWN	50mA
8	RED	Address A	50mA
SHELL	SHELL	Axis 2 DOWN	50mA

◆ LAP3N wiring

LAP3N for LAK2BN circuit diagram

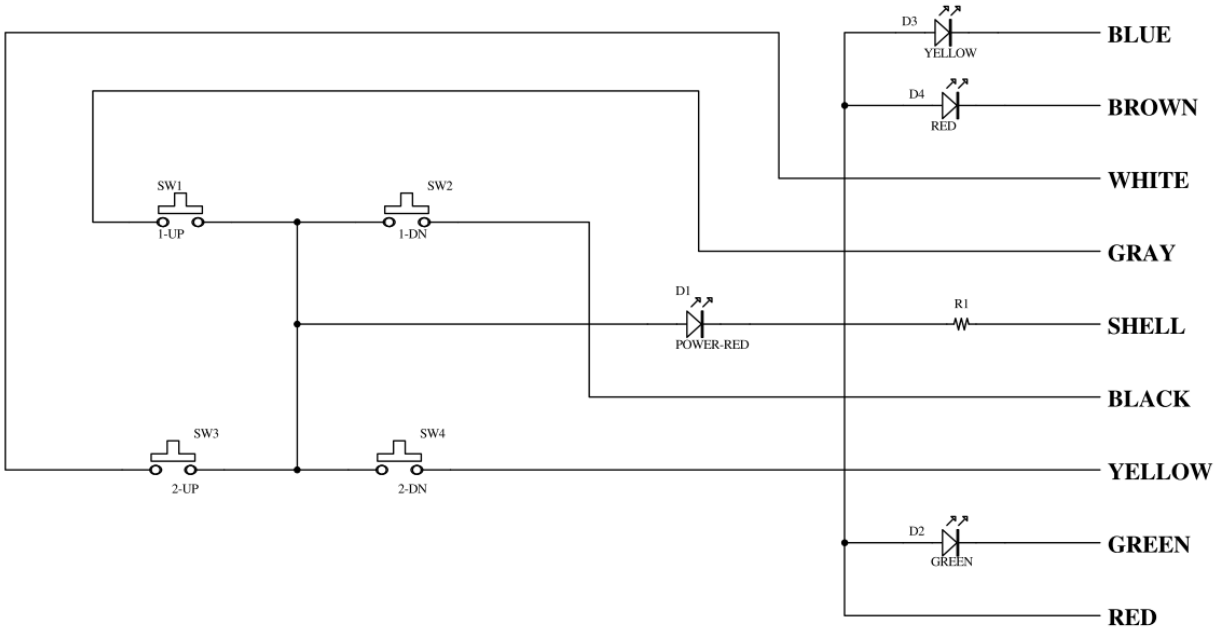


Figure 5.2.5.7

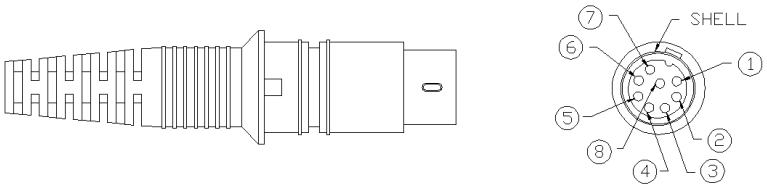


Figure 5.2.5.8

Table 5.2.5.4

DIN	WIRING	LAK2BN	Specification
1	GRAY	Axis 1 UP	50mA
2	BLACK	Axis 1 DOWN	50mA
3	WHITE	Axis 2 UP	50mA
4	YELLOW	Axis 2 DOWN	50mA
5	GREEN	LED_GREEN	10mA
6	BLUE	LED_YELLOW	10mA
7	BROWN	LED_RED	10mA
8	RED	DC_24V	220mA
SHELL	SHELL	GND	--

◆ LAP4G wiring

LAP4G for LAK4D circuit diagram

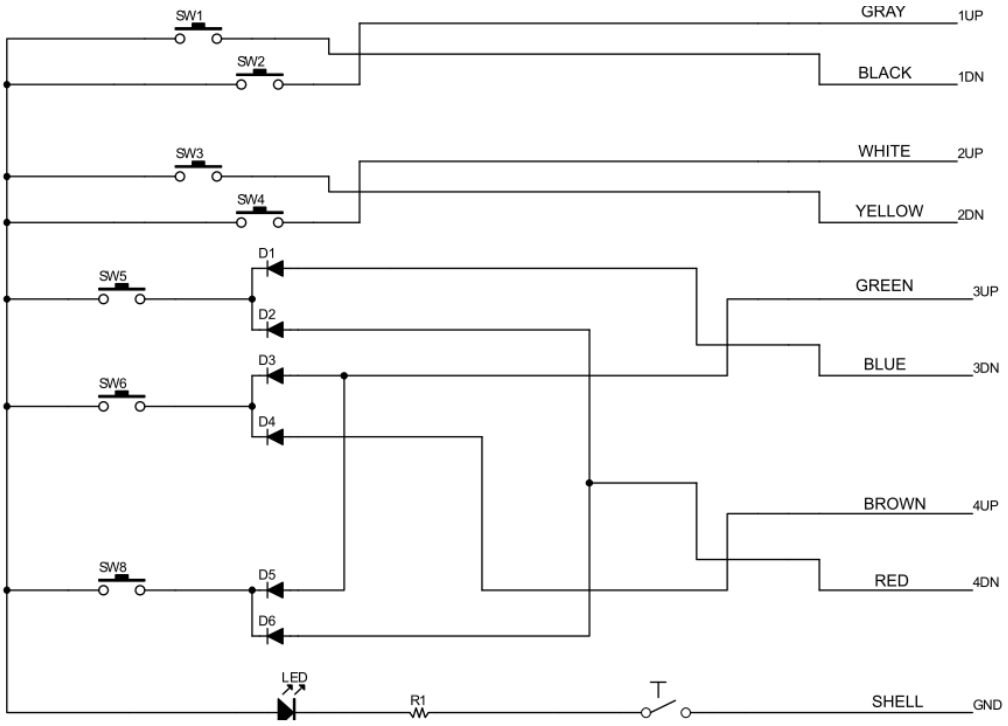


Figure 5.2.5.9

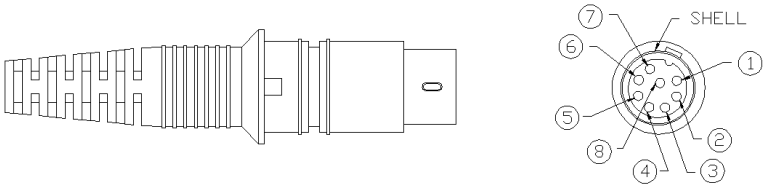


Figure 5.2.5.10

Table 5.2.5.5

DIN	WIRING	LAK4D
1	GRAY	Axis 1 UP
2	BLACK	Axis 1 DOWN
3	WHITE	Axis 2 UP
4	YELLOW	Axis 2 DOWN
5	GREEN	Axis 3 UP
6	BLUE	Axis 3 DOWN
7	BROWN	Axis 4 UP
8	RED	Axis 4 DOWN
SHELL	SHELL	GND

◆ LAP4N / LAP4R / LAP4M wiring

LAP4N / LAP4R / LAP4M for LAK4D circuit diagram

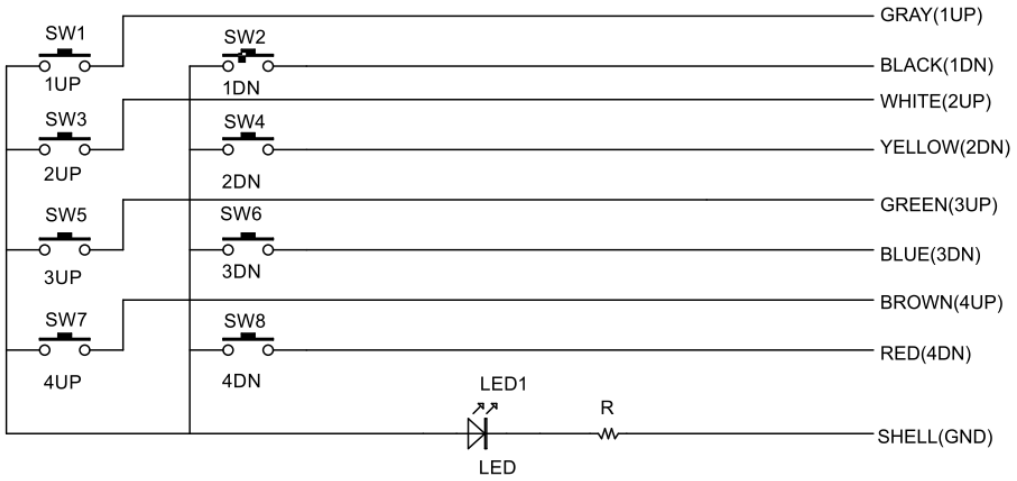


Figure 5.2.5.11

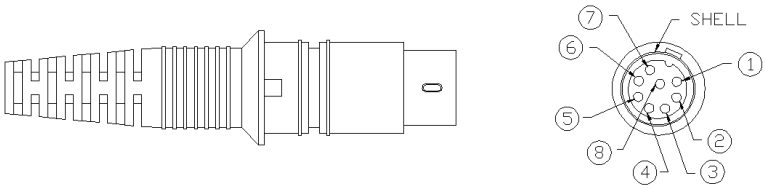


Figure 5.2.5.12

Table 5.2.5.6

DIN	WIRING	LAK4D
1	GRAY	Axis 1 UP
2	BLACK	Axis 1 DOWN
3	WHITE	Axis 2 UP
4	YELLOW	Axis 2 DOWN
5	GREEN	Axis 3 UP
6	BLUE	Axis 3 DOWN
7	BROWN	Axis 4 UP
8	RED	Axis 4 DOWN
SHELL	SHELL	GND

◆ LAP5 wiring

LAP5 for LAK6B circuit diagram

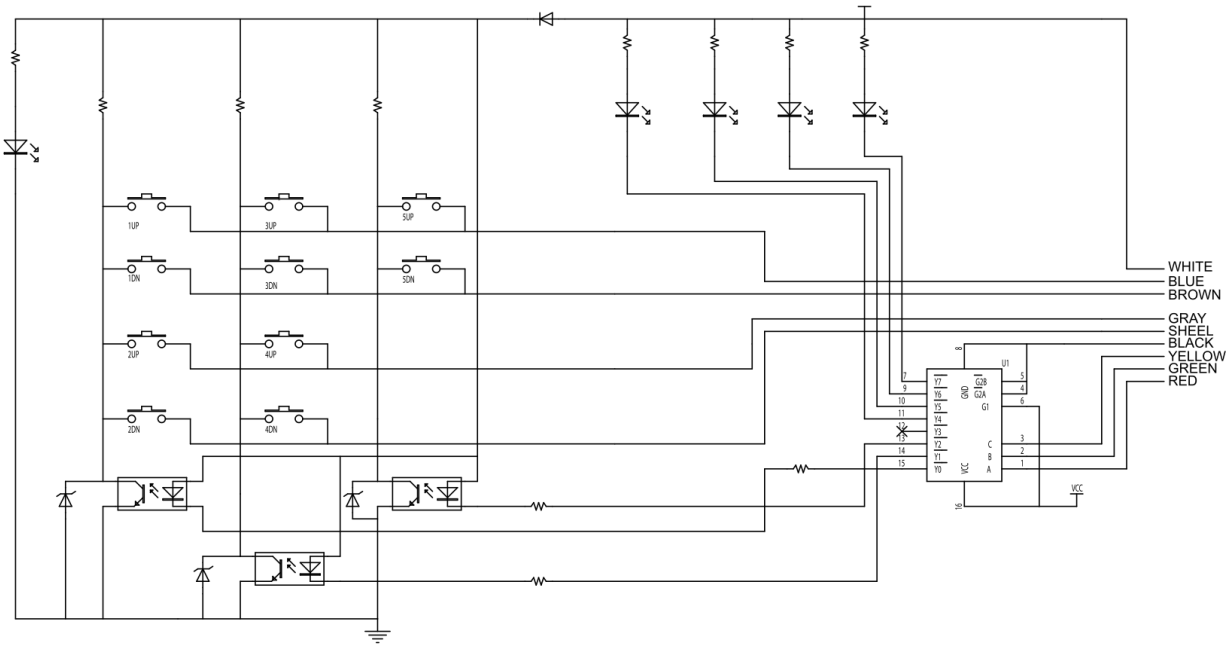


Figure 5.2.5.3

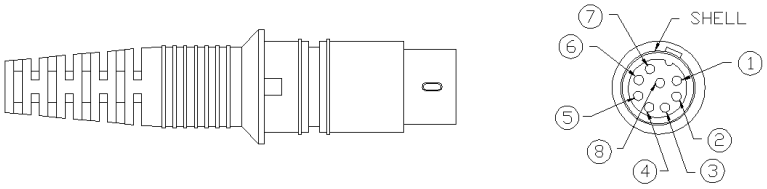


Figure 5.2.5.14

Table 5.2.5.7

DIN	WIRING	LAK6B	Specification
1	GRAY	Axis 2,4 UP	50mA
2	BLACK	GND	--
3	WHITE	VCC	220mA
4	YELLOW	Address C	50mA
5	GREEN	Address B	50mA
6	BLUE	Axis 1,3,5 UP	50mA
7	BROWN	Axis 1,3,5 DOWN	50mA
8	RED	Address A	50mA
SHELL	SHELL	Axis 2,4 DOWN	50mA

LAP5 for LAK2J circuit diagram

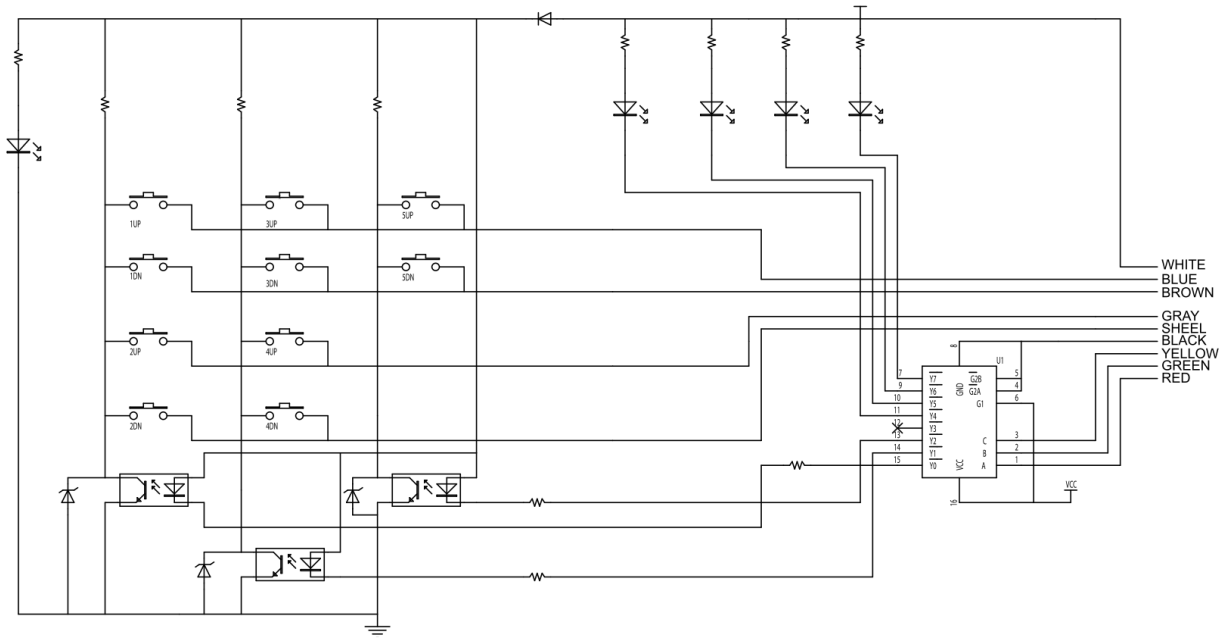


Figure 5.2.5.15

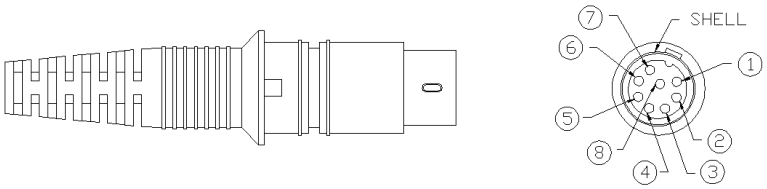


Figure 5.2.5.16

Table 5.2.5.8

DIN	WIRING	LAK2J	Specification
1	GRAY	Axis 2 UP	50mA
2	BLACK	GND	--
3	WHITE	VCC	220mA
4	YELLOW	Address C	50mA
5	GREEN	Address B	50mA
6	BLUE	Axis 1 UP	50mA
7	BROWN	Axis 1 DOWN	50mA
8	RED	Address A	50mA
SHELL	SHELL	Axis 2 DOWN	50mA

◆ True table

Table 5.2.5.9

C	B	A	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Description
0	0	0	0	1	1	1	1	1	1	1	Axis 1,2 Control Enable
0	0	1	1	0	1	1	1	1	1	1	Axis 3,4 Control Enable
0	1	0	1	1	0	1	1	1	1	1	Axis 5 Control Enable
0	1	1	1	1	1	0	1	1	1	1	No Used
1	0	0	1	1	1	1	0	1	1	1	Charge 25% LED ON
1	0	1	1	1	1	1	1	0	1	1	Charge 50% LED ON
1	1	0	1	1	1	1	1	1	0	1	Charge 75% LED ON
1	1	1	1	1	1	1	1	1	1	0	Charge 100% LED ON

◆ Connector drawings

LAK2 / LAK2LN / LAK2D / LAK2BN / LAK2J / LAK4D / LAK6B KEYPAD DIN drawings

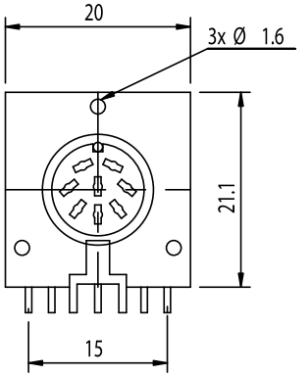


Figure 5.2.5.17

LAK2D / LAK2BN / LAK4D / LAK6B MOTOR DIN drawings

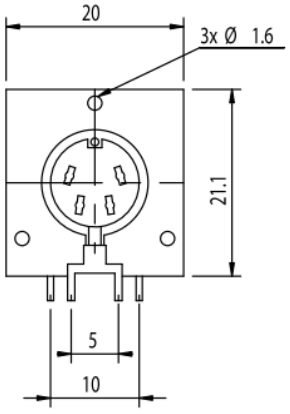


Figure 5.2.5.18

5.2.6 Battery installation

5.2.6.1 Installation of battery box on controller

◆ LAK2BN

Remove the connector cover from the battery box, insert the connector to the DC IN socket of controller, and plug in the power cable.

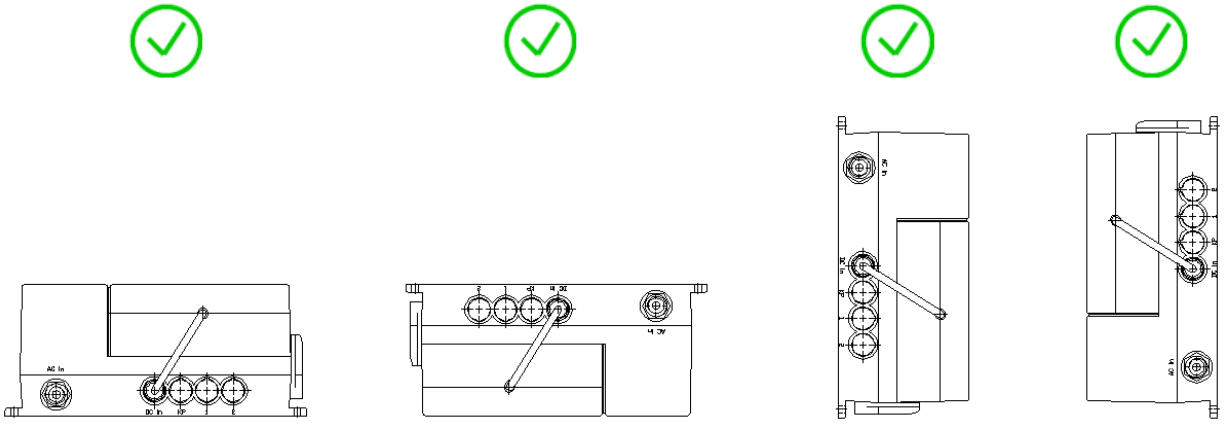


Figure 5.2.6.1.1

◆ LAK2J

1. LAK2J-11 controller can be charged directly with LAKCH-A. The indication light on LAKCH-A will be red when charging, green when charging completes.

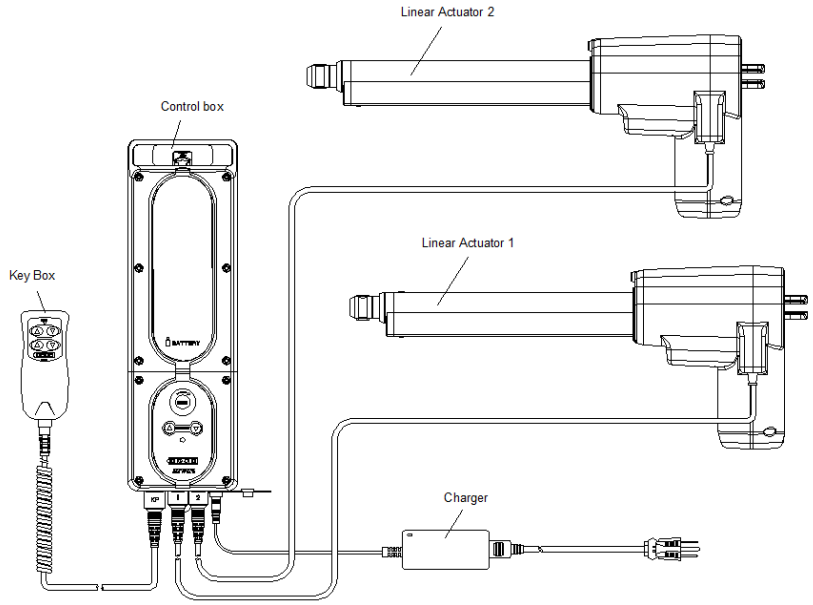


Figure 5.2.6.1.2

2. LAK2J controller cannot be used when charging (the controller will sound three short alert beeps if it is used). Remove AC power to use it.

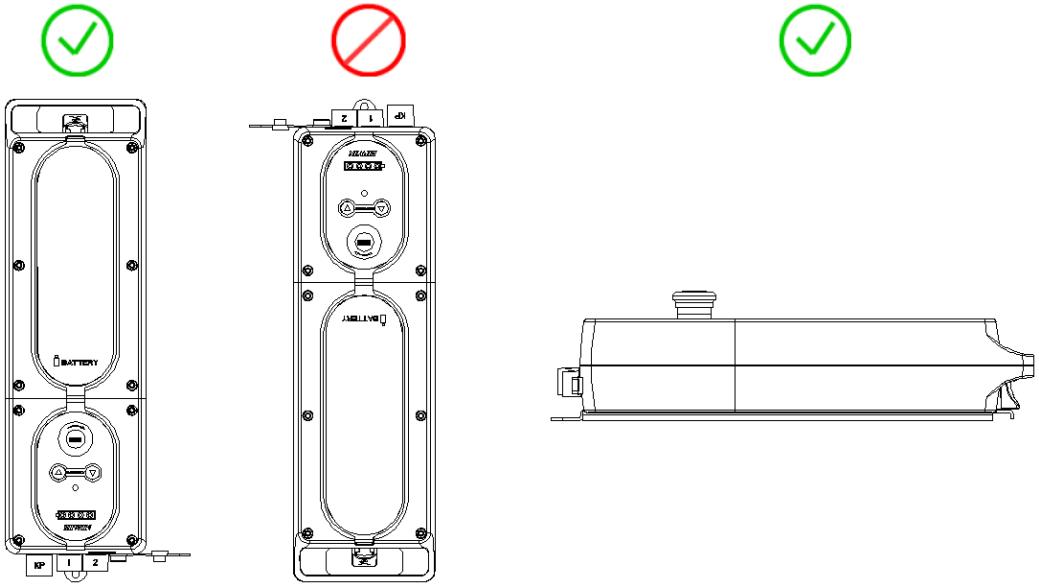


Figure 5.2.6.1.3

◆ LAK6B

1. Plug in the power cable to charge.
2. The CPU in the controller will automatically detect the battery capacity and charge when it is insufficient.

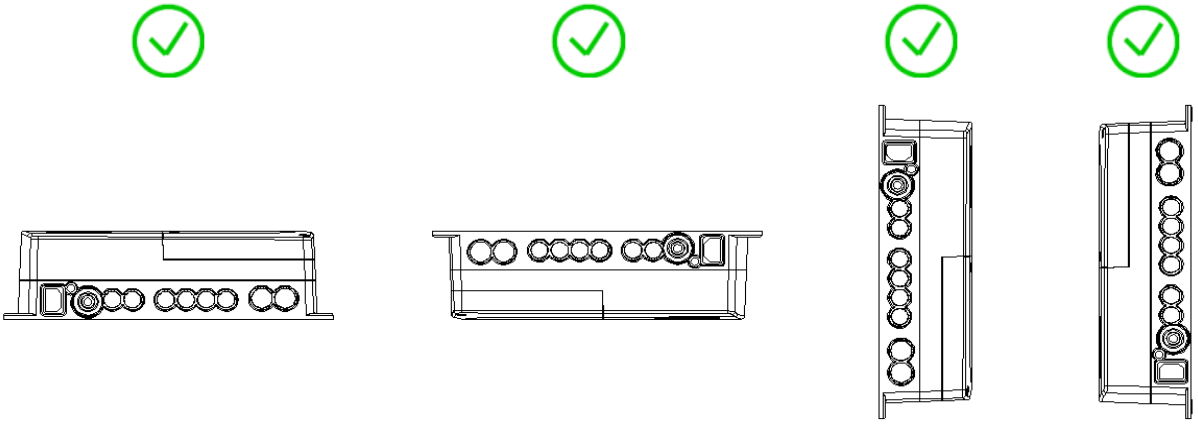


Figure 5.2.6.1.4

5.2.6.2 Precautions for battery use

⚠CAUTION

- Batteries will discharge in storage by itself to reduce the capacity. Therefore, they must be stored at a place around low temperature, dryness, no direct sunlight or fire.
- During the storage period, batteries should be recharged once every 3 months (a place where the environmental temperature is below 25°C). The environmental temperature starts from 25°C with an increase of 10°C, the recharge interval will shorten 1/2, and the speed of self-discharge will increase 2 times. The battery capacity cannot recover under the long-term storage of discharge.
- Stored batteries must be recharged before using (the first charging time needs about 8~12 hours).
- Batteries should be used as early as possible. First in/first out criteria had better to be followed.
- Batteries will gradually deteriorate in storage. The battery capacity cannot recover under the long-term storage even though recharging.
- Avoid overcharge as far as possible, and charge soon after discharging. When battery voltage drops, the machine cannot be driven. If there is some capacity left, batteries should be immediately charged after used. If not immediately charged, batteries will early degrade owing to lead acidification.
- When the level of insufficient power sounds, please immediately charge batteries to avoid permanent damage.
- LAK6B, LAK2BN batteries are designed for the outage use. Do not remove the power in the long term so that batteries can automatically recharge.
- LAK2J batteries are designed for the cycling use. It is recommended to use LAKCH for charging to keep batteries at the best condition.
- Disposal of the batteries: Please conform to local regulations.
- Short circuit of battery's output is prohibited.

- Charging method: constant voltage 2.4~2.5v/cell, initial current below 0.4cA, charge for 5~8 hours.
- Charging voltage: charging voltage for cycle usage is 14.4~15.0V (at 25°C (77°F)), floating voltage for standby usage is 13.5~13.8V (at 25°C (77°F)).
- Open-circuited voltage for fully charged batteries above 12.5V is qualified.

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6. Commissioning

6.1 Commissioning

◆ **Use guide for keypad's LOCK function**

Align the key with the knob. Turn left to enable the linear actuator; turn right to disable the linear actuator.

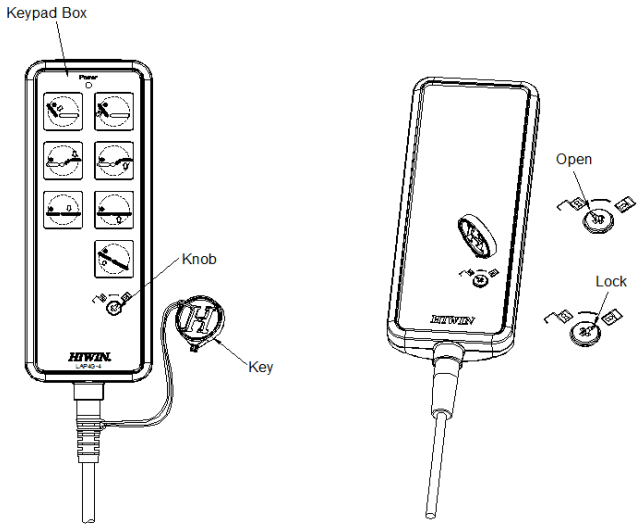

Figure 6.1.1

Stop turning left when the knob is turned about 45°; otherwise, the key will be damaged. The same goes for the opposite direction.

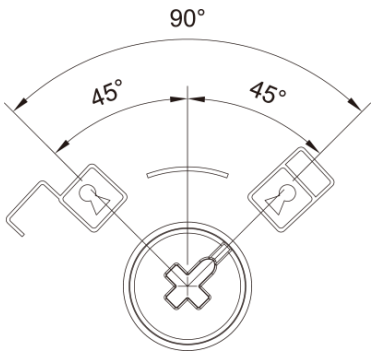

Figure 6.1.2

When the inner tube reaches the end limits of the stroke, the operation of linear actuator will automatically stop (This function is only applicable to LAS1~LAS4, LAM2, LAM3, LAN1, LAN3A, LAN5, LAC1 series).

For LAM1 series attached with HIWIN MIKROSYSTEM external limit switch, the operation of linear actuator will stop when the inner tube reaches the position of external limit switch (the controller LAK2LN with the function of controlling external limit switch should be used with).

Overcurrent protection device is one of the features of HIWIN MIKROSYSTEM controller; when linear actuator encounters an unknown obstacle during the operation or stops due to overload, the controller with overcurrent protection device will automatically stop to avoid the danger. If this situation occurs repeatedly, check if the system is correctly installed and the load is in the specified range. If the problem still cannot be solved, please notify the agent or dealer of HIWIN MIKROSYSTEM.

⚠CAUTION

- Before using the product, read the power supply indicated on the specification label and ensure the power supply meets the requirement. HIWIN MIKROSYSTEM is not responsible for any product damage or personal injury caused by wrong power supply.
- Turn on the power after controller and linear actuator are installed.
- Since there is a limit of power for controller's built-in transformer, check if the load exceeds the rated output power of controller before using it with linear actuator. Overrated use will result in the reduction of maximum thrust and speed for linear actuator as well as the acceleration in the temperature rise of controller.
- Do not repair the product by yourselves if something abnormal occurs. The product can only be repaired by HIWIN MIKROSYSTEM qualified technicians.
- If the connection method of controller is Y-type connector and it is damaged, contact the manufacturer or agent to replace it to avoid the danger.

◆ Use guide for LAKC1-1 overcurrent protector

Applicable to LAS1~LAS4, LAM1, LAN1~LAN5, LAC1 series linear actuator.

LAKC1-1 overcurrent protector is an overcurrent protection device for single-axis linear actuator, which can avoid the overcurrent caused by overload or other abnormal situations.

- Power supply: 12VDC or 24VDC; the required input power is indicated on the specification label.
- The overcurrent value is indicated on the specification label.
- Duty cycle: 10%
- Protection class: IP54 (upgrade to IP66 based on requirement)
- Operation and environment temperature: 5°C~40°C (41°F~104°F)

⚠CAUTION

- Before using the product, read the power supply indicated on the specification label and ensure the power supply meets the requirement. HIWIN MIKROSYSTEM is not responsible for any product damage or personal injury caused by wrong power supply.
- Turn on the power after LAKC1-1 overcurrent protector and linear actuator are installed.
- According to the product specifications, if users select the overcurrent protector below 10 A, an input and output power cable within 5 m with 1.25 mm^2 is recommended; if users select the overcurrent protector

above 10 A, an input and output power cable within 5 m with 2 mm^2 is recommended. This helps reducing the overcurrent caused by large resistance in power cable.

- If users select the input and output power cable over 5 m, the cable with larger diameter (greater than 2 mm^2) is recommended. This helps reducing the overcurrent caused by large resistance in power cable.

- **Installation guide for LAKC1-1 overcurrent protector**

During installation, fix two screw holes to prevent the power cable from falling off due to the shaking of overcurrent protector.

The installation of LAKC1-1 is shown as follows. Connect the suitable linear actuator to the output connector of LAKC1-1 and connect the input power (Power IN 12V/24VDC) to the input connector of LAKC1-1.

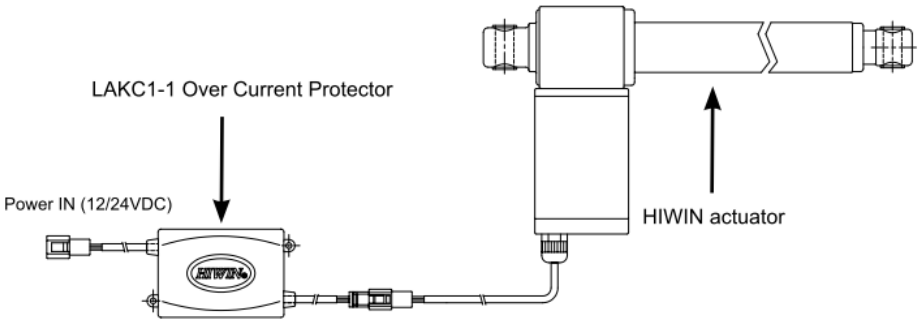

Figure 6.1.3

When the input power is connected (as the following figure shows), the inner tube of linear actuator will extend outward.

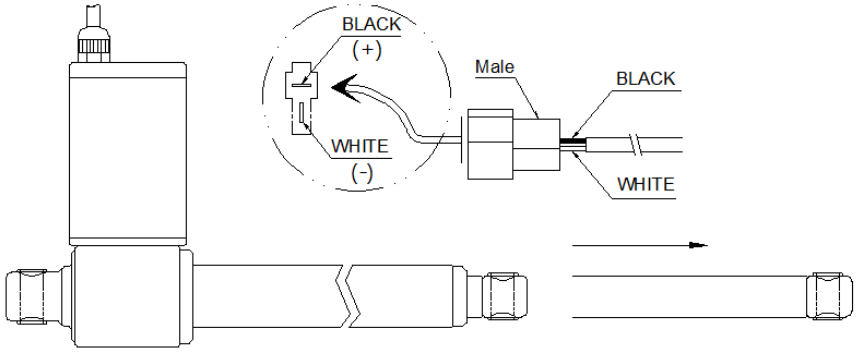

Figure 6.1.4

When the input power is reversely connected (as the following figure shows), the inner tube of linear actuator will retract inward.

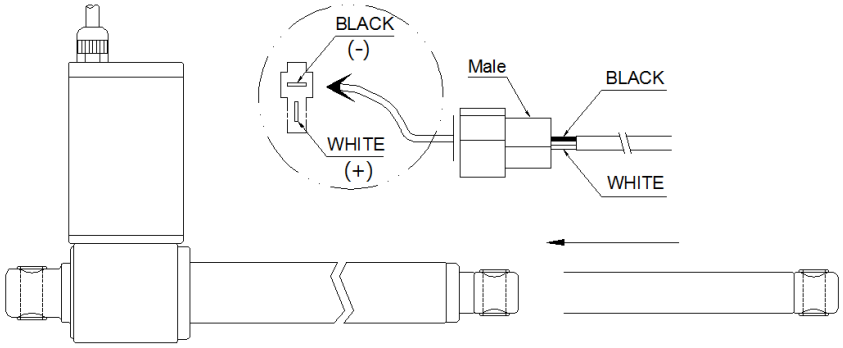

Figure 6.1.5

When linear actuator encounters an unknown obstacle during the operation or the overload time exceeds 0.8 seconds, LAKC1-1 will automatically stop. After LAKC1-1 is activated, it indicates that the working current has exceeded the rated value. At this time, disconnect the input power to reset LAKC1-1.

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7. Maintenance and cleaning

7.1 Maintenance

Table 7.1.1

Tool or equipment	✓ Screwdriver or torque wrench ✓ Lubricant ✓ Insulation resistance meter
Personal protective equipment	✓ Safety shoes ✓ Protective helmet ✓ Protective gloves

Please read all safety instructions before performing linear actuator maintenance.

DANGER

Danger from electric voltage!

- Work can only be carried out by a qualified electrician and with the power supply disconnected!
- Before carrying out work on the linear actuator system, disconnect the power supply and protect it from being switched back on!

WARNING

Risk of personal injury or damage to property.

- Do not disassemble the linear actuator or controller.
- Do not attempt to change wiring while the power is ON.

WARNING

Risk of personal injury.

- Lifting heavy loads may damage your health.
- Use a hoist of an appropriate size when positioning heavy loads which are over 20 kg!
- Check applicable occupational health and safety regulations when handling suspended loads!

⚠WARNING

Risk of personal injury or damage to property.

- Obstacle removal and maintenance can only be performed by HIWIN MIKROSYSTEM technicians or authorized dealers, and with appropriate protective equipment.
- Do not perform any maintenance actions while the linear actuator is running.
- Clean the metal particles on the linear actuator regularly.

7.2 Cleaning

Table 7.2.1

Tool or equipment	✓ Rag ✓ 70% alcohol
Personal protective equipment	✓ Safety shoes ✓ Protective helmet ✓ Protective gloves ✓ Protective goggles

■ **Frequency of the inspections / tests / maintenance**

Linear actuator is a linear motion component that can be easily operated to control its extended and retracted positions. Improper operation or incorrect use environment will shorten the life of the linear actuator or even damage it. It is recommended to conduct measurement and maintenance quarterly, please refer to the following instructions for maintenance and inspections:

(1) The mechanical or electrical connection must not be loosened.
(2) Detect possible wear or aging of the cable.
(3) Clean the dirt on the surface of the shell, outer tube, inner tube with 70% alcohol.

7.2.1 Test run

According to the axis number of linear actuator and the type of controller, the keypad can only match the corresponding linear actuator. The example of using a linear actuator with two-key keypad is as follows:

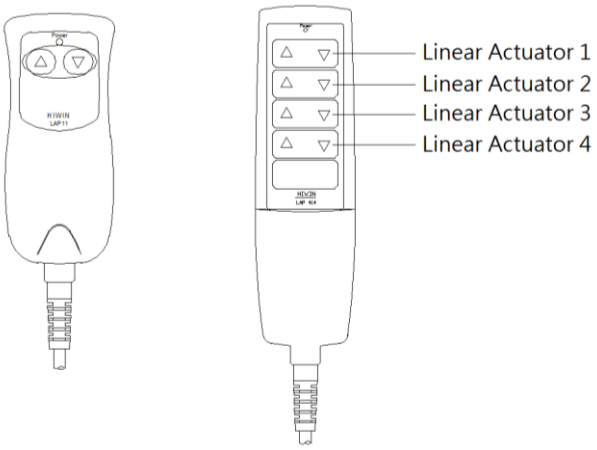

Figure 7.2.1.1

When users press the △ key, the inner tube of linear actuator will extend outward.

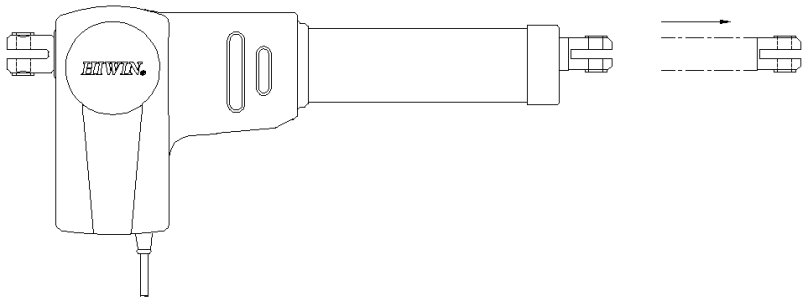

Figure 7.2.1.2

When users press the ▽ key, the inner tube of linear actuator will retract inward.

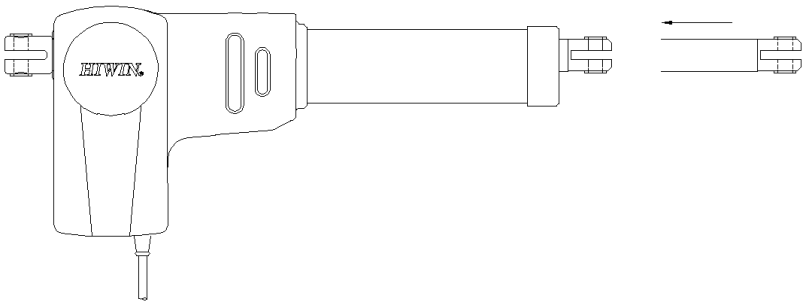

Figure 7.2.1.3

8. Disposal

8.1 Waste disposal

8.1.1 General

DANGER

Danger from electric voltage!

Before and during assembly, disassembly and repair work, dangerous currents may flow.

- Work can only be carried out by a qualified electrician and with the power supply disconnected!
- Before carrying out work on the linear actuator system, disconnect the power supply and protect it from being switched back on!

8.1.2 Tools and equipment

Table 8.1.2.1

Tool or equipment	✓ Screwdriver ✓ Torque wrench
Personal protective equipment	✓ Safety shoes ✓ Protective helmet ✓ Protective gloves

8.1.3 Decommissioning

WARNING

Risk of personal injury or damage to property.

- If users do not follow the orders to deactivate the linear actuator, it may cause personal injury, death or property damage.

Follow the steps below to disassemble or deactivate the linear actuator:

1. Stop operating the linear actuator and wait for the controller power supply to discharge completely.
2. Remove all power cables and signal cables.

3. Remove all the fixed parts at the machine end. If the linear actuator is fixed, it can be separated from the machine at the same time.
4. Clean the foreign matter, debris and dust on the linear actuator.
5. Use the original packaging or a safe way to pack and store it correctly.

8.1.4 Disposal

Products need to be disposed according to the normal recycling process in accordance with laws and regulations.

⚠WARNING

Risk of personal injury or damage to property.

- If the linear actuator or related components (especially the motor with strong magnets) are not handled correctly, it may cause personal injury, death or property damage.
- Please ensure that the linear actuator and related components are disposed of correctly.

Appropriate disposal process is as follows:

- The magnets in the motor assembly must be completely demagnetized.
- The components to be recycled need to be disassembled:
  (1) Electronic waste (e.g., feedback components, circuit board assembly)
  (2) Electrical waste (e.g., motor, cables)
  (3) Scrap metal alloys (classified by metal)
  (4) Insulation material
- Do not mix with solvents, cold cleaning agents or residue of paint.

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9. Troubleshooting

9.1 Troubleshooting

Table 9.1.1

Symptom	Cause	Action
The motor does not work	The linear actuator is not connected to the controller	Connect the linear actuator to the control box.
	Damaged power cable	Get the linear actuator repaired.
The motor works, but the linear actuator does not work	Damaged gear	Get the linear actuator repaired.
The linear actuator fails to work full load	Damaged gear	Get the linear actuator repaired.
	Damaged motor	Get the linear actuator repaired.
No respond for limit switch	Abnormal limit switch	Get the linear actuator repaired.
No respond for position feedback	Abnormal position feedback	Get the linear actuator repaired.
The linear actuator can only retract but not extend	Incorrect power cable wiring	Get the linear actuator repaired.
The power signal is off	Blown fuse	Replace the fuse or get the controller repaired.
	Incorrect power cable wiring	Replace the power cable.
	Power cable malfunction	Get the controller repaired.
	Controller malfunction	Get the controller repaired.
The power signal is on, but the linear actuator does not work	The linear actuator is not plugged into the controller	Correctly plug the linear actuator into the controller.
Controller relay noise	Damaged controller	Get the controller repaired.
Controller battery level warning sound	Dead battery	Charge the battery.

10. Declaration of incorporation

10.1 Declaration of incorporation

HIWIN MIKROSYSTEM

大銀微系統股份有限公司
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HIWIN MIKROSYSTEM CORP.
No.6, Jingke Central Rd., Precision Machinery Park, Taichung 40852, Taiwan
www.hiwinmikro.tw
business@hiwinmikro.tw

Declaration of Incorporation

according to EC directive 2006/42/EC on machinery (Annex II 1. B)

Name and address of the manufacturer:
HIWIN MIKROSYSTEM CORP., No.6, Jingke Central Rd., Taichung Precision Machinery Park, Taichung 408226, Taiwan

The person authorized to compile the relevant technical documentation
Werner Mäurer, HIWIN GmbH, Brücklesbünd 1, D-77654 Offenburg

Description and identification of the partly completed machine:

Product	Linear Actuator
Identification	Series: LAC1, LAM1, LAM2, LAM3, LAN1, LAN3A, LAN4, LAN5, LAS1, LAS2, LAS3, LAS4

It is hereby declared that the following essential requirements of the Machinery Directive 2006/42/EC have been fulfilled.
1.1.5, 1.3, 1.3.2, 1.3.3, 1.3.4, 1.3.9, 4.1.2.3, 4.1.3, 4.3.2, 4.3.3, 4.4.1, 4.4.2

It is declared that the relevant technical documentation specified under Annex VII Part B has been compiled. It is hereby explicitly declared that the partly completed machine complies with all of the pertinent conditions in the following EC Directives.

2014/30/EU	EMC directive
2014/35/EU	Low voltage directive
2011/65/EU	RoHS directive

Harmonized Standards

EN 60335-1:2012/AC:2014 EN 60335-1:2012/A11:2014 EN 60335-1:2012/A13:2017 EN 60335-1:2012/A15:2021	Household and similar electrical appliances - Safety - Part 1: General requirements
EN 60204-1:2018	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
EN 55011:2016 EN 55011:2016/A1:2017 EN 55011:2016/A11:2020	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement
EN 55014-1:2017 EN 55014-1:2017/A11:2020	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission
EN 55014-2:1997 EN 55014-2:1997/A1:2001 EN 55014-2:1997/A2:2008 EN 55014-2:1997/AC:1997	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 2: Immunity - Product family standard
EN 61000-3-2:2014	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <= 16 A per phase)
EN 61000-3-3:2013	Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <= 16 A per phase and not subject to conditional connection
EN 60601-1:2006 EN 60601-1:2006/AC:2010 EN 60601-1:2006/A1:2013	Medical electrical equipment - Part 1: General requirements for basic safety and essential performance

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The manufacturer undertakes to transmit, in response to a reasoned request by the national authorities, the relevant documentation on the partly completed machinery. This is without prejudice to the intellectual property rights of the manufacturer!

Important note!
The partly complete machinery may not be commissioned until it has been ascertained that the machinery into which this partly completed machinery is to be incorporated is compliant with the provisions of this directive.

Taichung 408226, Taiwan		
19.01.2023	**YU, KAI-SHENG, Executive Vice President**	
(Place, Date)	(Surname, first name, and function of signatory)	(Signature)

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11. Appendix

11.1 Glossary

- **Input voltage [V]**
  The voltage of the motor.

- **Output power [W]**
  The output power of the controller.

- **Maximum thrust [N]**
  The maximum load weight that the linear actuator can push.

- **Maximum pulling [N]**
  The maximum load weight that the linear actuator can pull.

- **Maximum holding [N]**
  The force by which a weight does not slide down when the linear actuator stops midway through its travel.

- **Maximum current [A]**
  The current value generated by the linear actuator at maximum thrust.

- **Speed [mm/s]**
  The speed of the linear actuator when extending or retracting.

- **Stroke [mm]**
  Total length that the linear actuator extends.

- **Retracted length [mm]**
  Basic installation dimensions of the linear actuator.

- **Protection class**
  IP protection class according to EN 60034.

11.2 Unit conversion

To convert the unit in column B to the unit in column A, multiply by the corresponding figure in the table.

- Mass

		B			
		g	kg	lb	oz
A	g	1	0.001	0.0022	0.03527
	kg	1000	1	2.205	35.273
	lb	453.59	0.45359	1	16
	oz	28.35	0.02835	0.0625	1

- Linear velocity

		B				
		m/s	cm/s	mm/s	ft/s	in/s
A	m/s	1	100	1000	3.281	39.37
	cm/s	0.01	1	10	3.281×10^{-2}	0.3937
	mm/s	0.001	0.1	1	3.281×10^{-3}	3.937×10^{-2}
	ft/s	0.3048	30.48	304.8	1	12
	in/s	0.0254	2.54	25.4	8.333×10^{-2}	1

- Force

		B		
		N	lb	oz
A	N	1	0.2248	3.5969
	lb	4.4482	1	16
	oz	0.2780	0.0625	1

■ Length

		B				
		m	cm	mm	ft	in
A	m	1	100	1000	3.281	39.37
	cm	0.01	1	10	3.281×10^{-2}	0.3937
	mm	0.001	0.1	1	3.281×10^{-3}	3.937×10^{-2}
	ft	0.3048	30.48	304.8	1	12
	in	0.0254	2.54	25.4	8.333×10^{-2}	1

■ Temperature

		B	
		°C	°F
A	°C	1	(°F - 32) x 5 / 9
	°F	(°C x 9 / 5) + 32	1

11.3 Tolerances and hypotheses

11.3.1 Tolerances

Table 11.3.1.1

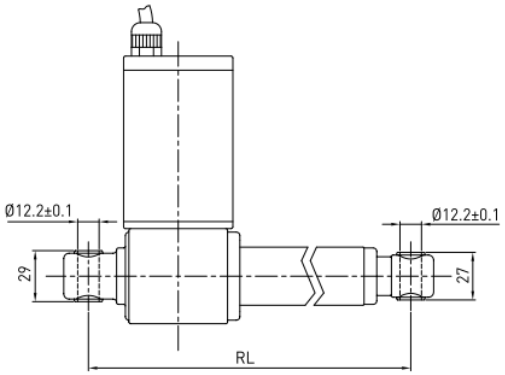
Tolerances (mm)							
<6	6~30	30~120	120~300	300~600	600~1200	1200~2400	>2400
±0.1	±0.2	±0.3	±0.4	±0.5	±0.8	±1.0	±1.5

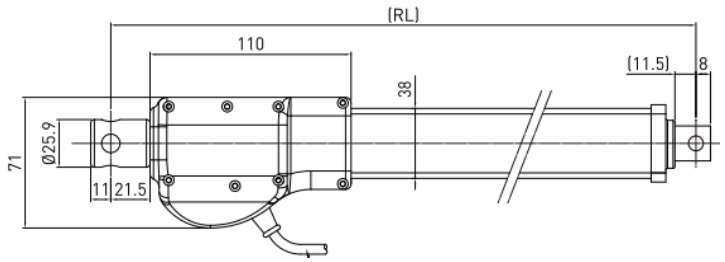
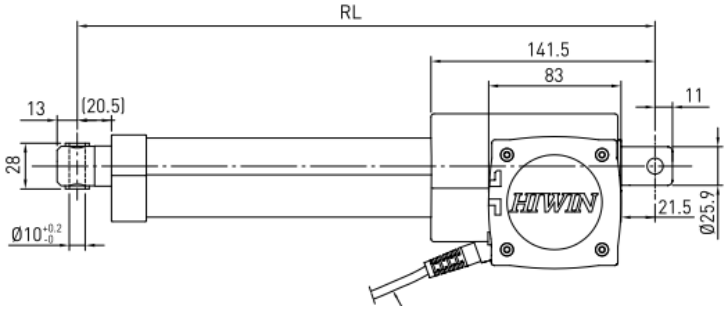
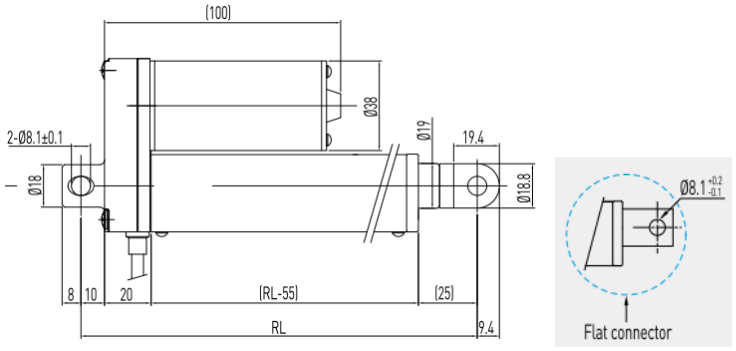
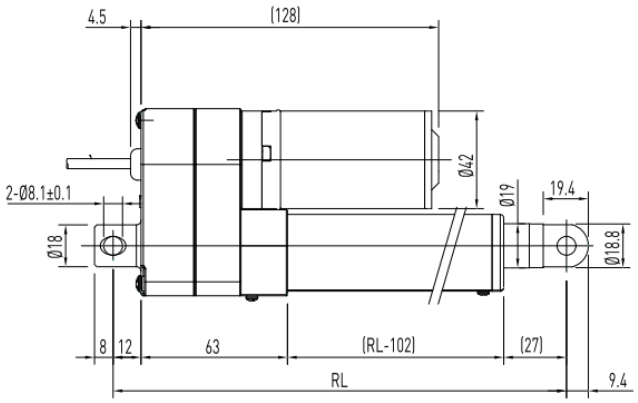
11.3.2 Hypotheses

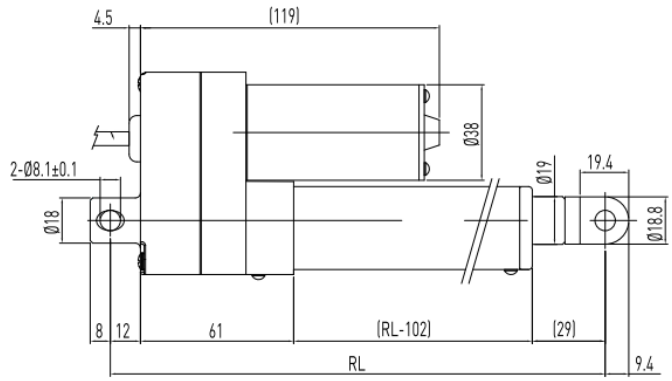
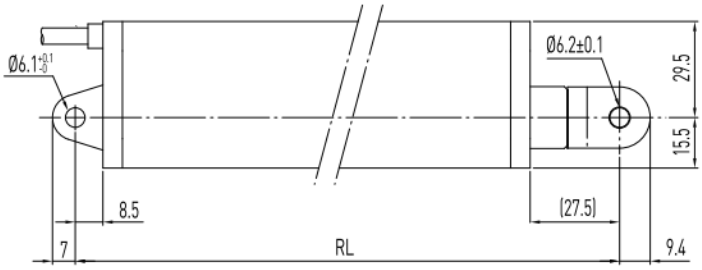
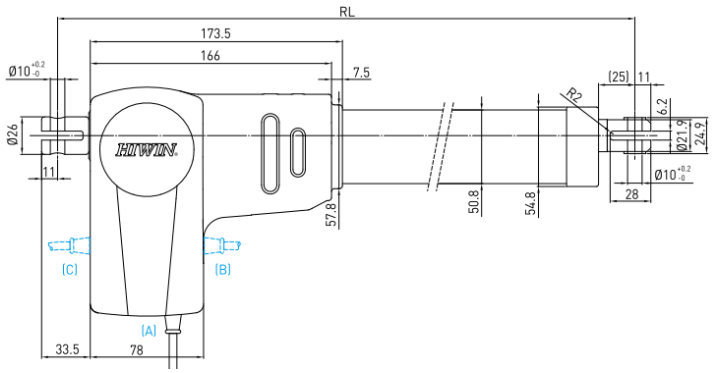
Operation staff are trained in the safe operation practices for linear actuator systems and have fully read and understood this user manual. Maintenance staff maintain and repair linear actuator systems in such a way that they pose no danger to people, property or the environment.

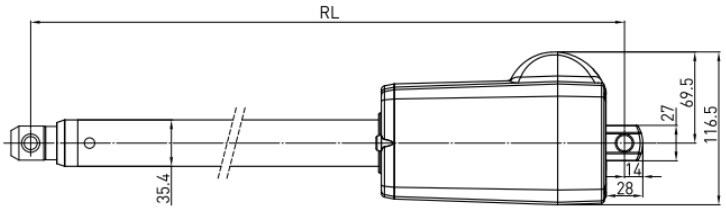
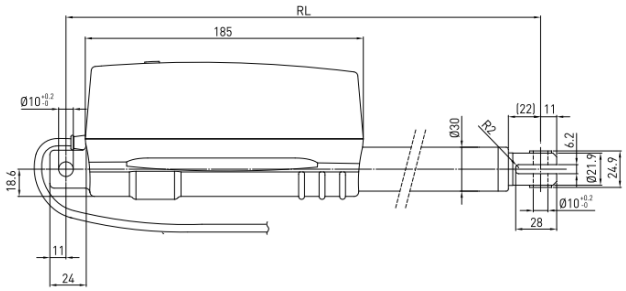
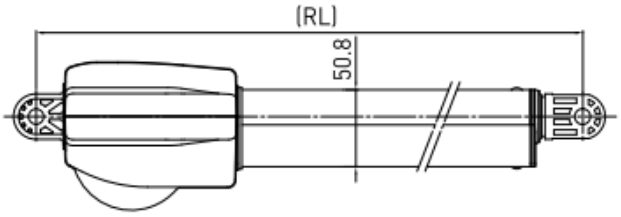
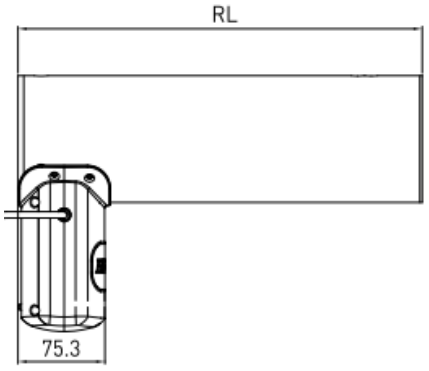
11.4 Supplementary formula

Table 11.4.1

Series	Mechanical Structure	Retracted Length Calculation
LAM1		● LAM1-1/-2 RL=S+153; Stroke≤400 ● LAM1-1A RL=S+162; Stroke≤400

Series	Mechanical Structure	Retracted Length Calculation
LAM2		● Standard RL=S+157; Stroke≤300 ● External limit switch RL=S+207; Stroke≤300
LAM3		● Standard RL=S+171; Stroke≤300 RL=S+221; Stroke=350, 400 ● Safety nut RL=S+183; Stroke≤300 RL=S+233; Stroke=350, 400
LAS1		● Standard RL=S+119; Stroke≤250 RL=S+169; Stroke=350 ● Rod end with flat connector RL=S+110; Stroke≤250 RL=S+160; Stroke=300
LAS2		● Standard RL=S+146; Stroke≤250 ● Position feedback RL=S+154; Stroke≤250 ● Rod end with flat connector RL=S+133; Stroke≤250 ● External limit switch RL=S+174; Stroke≤250

Series	Mechanical Structure	Retracted Length Calculation
LAS3		● Standard RL=S+146; Stroke≤250 ● Position feedback RL=S+154; Stroke≤250 ● Rod end with flat connector RL=S+133; Stroke≤250 ● External limit switch RL=S+172; Stroke≤250
LAS4		● Standard RL=S+222.5; Stroke≤300 ● Position feedback RL=S+226; Stroke≤300
LAN1		● Standard RL=S+173; Stroke≤250 ● Safety nut RL=S+185; Stroke≤250 ● Spline RL=S+223; Stroke≤250

Series	Mechanical Structure	Retracted Length Calculation
LAN3A		● Standard RL=S+220; Stroke<200 RL=S+260; Stroke=200~500 ● Position feedback RL=S+231; Stroke<200 RL=S+271; Stroke=200~500 ● Spline RL=S+262; Stroke<200 RL=S+302; Stroke=200~500 ● Safety nut RL=S+232; Stroke<200 RL=S+272; Stroke=200~500 ● External limit switch RL=S+300; Stroke<200 RL=S+340; Stroke=200~500
LAN4		● Standard RL=S+160; Stroke≤400 ● Safety nut RL=S+174; Stroke≤400 ● Spline RL=S+200; Stroke≤400
LAN5		● LAN5-1 RL=S+163; Stroke≤200 ● LAN5-2 RL=S+163; Stroke≤250 ● LAN5-3/-4 RL=S+163; Stroke≤300
LAC1		● Standard RL=310; Stroke≤300 RL=360; Stroke=301~400 RL=410; Stroke=401~500

Note: RL=retracted length; Stroke=stroke

11.5 Optional accessories

11.5.1 For linear actuator

Table 11.5.1.1

	IP54	IP65	IP66	Back Fixture Turn	Flat Connector	Safety Nut	Spline	Quick Release
LAM1 series	●	▲		▲				
LAM2 series	●		▲	▲	●			
LAM3 series	●		▲	▲		▲		
LAS1 series	●		▲	▲	▲			
LAS2 series	●		▲	▲	▲			
LAS3 series	●		▲	▲	▲			
LAS4 series	●	▲						
LAN1 series	●		▲	▲		▲	▲	
LAN3A series	●		▲	▲		▲	▲	▲
LAN4 series	●		▲			▲	▲	
LAN5 series	●	◆	■	▲		▲	▲	▲
LAC1 series	●							

● : Standard

▲ : The option is available

◆, ■ : Only one option is available

Table 11.5.1.2

	Internal Limit	External Limit	Hall Sensor			POT	MR Sensor
			NPN	PNP	TTL		
LAM1 series		▲					
LAM2 series	●	▲					▲
LAM3 series	●						
LAS1 series	●	▲					
LAS2 series	●	▲	■	■	■	■	
LAS3 series	●	▲	■	■	■	■	
LAS4 series	●		▲		▲		
LAN1 series	●		▲		▲		
LAN3A series	●	▲				▲	▲
LAN4 series							
LAN5 series	●		▲		▲		
LAC1 series	●		■		■	■	

● : Standard

▲ : The option is available

◆, ■ : Only one option is available

11.5.2 For controller

Table 11.5.2.1

		LAK2LN	LAK2	LAK2BN	LAK2D	LAK2J	LAK4D	LAK6B
IP54		●	●	●	●	●	●	●
IP65						▲		
IP66		▲	▲	▲	▲		▲	▲
Input voltage	DC 12V		■					
	DC 24V		■			●		
	AC 100V	■	■	■	■		■	■
	AC 110V	■	■	■	■		■	■
	AC 120V	■	■	■	■		■	■
	AC 220V	■	■	■	■		■	■
	AC 230V	■	■	■	■		■	■
Output power (24V)	72.5VA						●	■
	108VA	●	●		●			
	144VA						■	■
	216VA						■	●
Max. control axis no.		1	2	2	2	2	4	6
Overload protection		●	●	●	●			●
Relay protection			●	●	●	●		●
Battery	9V alkaline				▲			
	1.3Ah (lead-acid)			■				●
	2.9Ah (lead-acid)			■				
	4.5Ah (lead-acid)					●		
Charging function				●		▲		●
Energy-saving				●		●		●
Customized program				▲		▲		▲
Control external limit switch		●						▲
Mounted with linear actuator					●		●	
Detachable cable retainer							●	
Removable power cable							●	●

● : Standard

▲ : The option is available

◆, ■ : Only one option is available

11.5.3 Overcurrent classification table

Table 11.5.3.1

Code No.	Overcurrent Setting	Linear Actuator Model	Controller Model
A	2.5 A	LAS4-1	LAK2; LAK2D; LAK2LN; LAK2BN; LAK2J; LAK4D; LAK6B
B	3.0 A	LAS1-1; LAS3-1	LAK2; LAK2D; LAK2LN; LAK2BN; LAK2J; LAK4D; LAK6B
C	4.0 A	LAS1-2; LAS3-2; LAS4-2; LAM2-3; LAS2-1	LAK2; LAK2D; LAK2LN; LAK2BN; LAK2J; LAK4D; LAK6B
D	5.0 A	LAM3-4; LAN5-2/-3/-4; LAM2-1/-2	LAK2; LAK2D; LAK2LN; LAK2BN; LAK2J; LAK4D; LAK6B
E (24V)	6.0 A	LAM3-2; LAN4-3/-4; LAN5-1; LAC1	LAK2; LAK2D; LAK2LN; LAK2BN; LAK2J; LAK4D; LAK6B
E (12V)	6.0 A	LAS1-1; LAS3-1; LAS4-1; LAM2-3; LAS2-1	LAK2(DC)
F (24V)	7.0 A	LAM3-1; LAN4-1/-2; LAN5-3/-4(24Q)	LAK2; LAK2D; LAK2LN; LAK2BN; LAK2J; LAK4D; LAK6B
F (12V)	7.0 A	LAS1-2; LAS3-2; LAS4-2; LAM2-3	LAK2(DC)
G (24V)	8.0 A	LAM1-1/-2/-1A; LAN5-1/-2(24Q)	LAK2; LAK2LN; LAK2J; LAK6B
G (12V)	8.0 A	LAM1-1/-2	LAK2(DC)
H (24V)	9.0 A	LAN3A-1/-2/-3/-4	LAK2J; LAK6B
H (12V)	9.0 A	LAM2-1/-2	LAK2(DC)
I	10 A	Reserved	
J	12 A	LAN3A-1/-2/-3/-4(24Q)	LAK2J; LAK6B
K	14 A	Reserved	
L	15 A	LAN1-1/-2/-3; LAM1-1/-2/-1A; LAM3; LAN4	LAK2(DC)
Z	** A	Special current value (special requirement)	

11.6 Customer request form

*Required **HIWIN MIKROSYSTEM** Customer's Requirements (LA) No: _____

*Customer		*Application	☐Medical ☐Aviation ☐Automobile ☐Other_____
Tel		Fax	
Contact sales		Customer's Email	

Linear Actuator ☐Specification_____	
*Stroke (mm)	
*Retracted length (mm)	☐Based on catalog ☐Special length_____
*Max. thrust (N) *Max. pulling (N) *Max. holding (N) *Load (N) (Fill in one of them)	_____☐Based on catalog _____☐Based on catalog _____☐Based on catalog _____☐Based on catalog
*Full load speed (mm/s)	
*Protection class (IP)	
*Voltage VDC (V)	☐24V ☐Special_____V ☐12V
*Demand (per year / per month)	
Max. load current (A)	
No load current (A)	
Operation temp. (°C)	
Outdoor use	☐Yes ☐No
Installation direction	☐Horizontal ☐Vertical
Use HIWIN MIKROSYSTEM limit switch	☐Yes ☐No
Add position feedback	☐Yes ☐No
Power cable length (M)	☐Based on catalog ☐Special length_____M

Controller ☐Specification_____	
Use HIWIN MIKROSYSTEM controller	☐Yes (Fill in the columns with *) ☐No
*Input voltage (V)	AC_____V or DC_____V
*Control axis no.	
*Plug type of power cable	☐US ☐UK ☐EU ☐Other_____
*Protection class (IP)	
*Demand (per year / per month)	☐Same as linear actuator ☐Other_____
Removable power cable	☐Yes (only for LAK6B) ☐No
Operation temp. (°C)	
Outdoor use	☐Yes ☐No
Customized program	☐Yes (Describe the function) ☐No
Housing color	☐Gray ☐Black
Backup battery	☐Yes (only for LAK2BN or LAK6B) ☐No

Keypad ☐Specification_____	
Use HIWIN MIKROSYSTEM keypad	☐Yes (Fill in the columns with *) ☐No
*Control axis no.	
*Demand (per year / per month)	
Housing color	☐Gray ☐Black
Key mode	☐Membrane ☐Rubber
LOCK function	☐Yes (only for LAP4G) ☐No

Other function / requirement:

Recommended specification: (Filled in by HIWIN MIKROSYSTEM engineers)