DH-ROBOTICS

LINEAR COIL ACTUATOR

DH-Robotics Technology Co.,Ltd.

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CONTENTS

FEATURES AND APPLICATIONS

Product Series	Drive Mode	Maximum Stroke	Maximum Thrust	Application Scenarios
VLA	Linear Coil Motor	25mm	30N	**3C testing industry:** key testing of mobile phones and computers, panel testing, and watch strap testing.
				Automotive industry: key and switch testing of automotive centre stack.
				Semiconductor industry: chip testing, chip sorting, etc.
VLAR	Linear Coil Motor + Servo Motor	25mm	16N	**Semiconductor industry:** IGBT chip bonding, chip sorting, testing, etc.
				3C industry: precision parts assembly, mobile phone cameras assembly, force controlled stud implantation, automatic transplanting, loading and unloading, accessories mounting, etc.
DLAR	Linear Motor + Servo Motor	50mm	60N	**Semiconductor industry:** IGBT chip bonding, chip sorting, testing, etc.
				3C industry: Precision parts assembly, mobile phone cameras assembly, force controlled stub implantation, force controlled BTB snap-fit, automatic transplanting, loading and unloading, accessories mounting, etc.
DLSR	Linear Motor + Closed-loop Stepper Motor	50mm	26N	**3C industry:** precision parts assembly, force controlled stud implantation, automatic transplanting, loading and unloading, accessories mounting, PCB board plug-in, flexible circuit board mounting and reinforcing, etc.
				Renewable energy: loading and unloading of small battery parts.
DLE	Linear Motor	50mm	54N	**3C industry:** precision parts assembly, line scanning detection, force controlled push and positioning, terminal snap-fit, automatic transplanting, loading and unloading, etc.

Note: These are the product features and applications of standard Linear coil actuator products (excluding customized products) of DH-Robotics.

PRODUCT FEATURES

3 Working Modes
- Velocity mode
- Torque mode
- Position mode

Compact design, thin and light. The thinnest product thickness is only **10 mm**

Application Scenarios

Hi-speed pick and place

Precision machining

Automated production line

Soft Landing
Contact the surface of an object with high speed and low force

- Force repeatability: ±5 g
- Stroke resolution: up to 0.5 μm
- Positioning repeatability: ±2 μm
- Rotary position resolution: 0.005°

DH-ROBOTICS

The force generated by the voice coil actuator is proportional to the current. The voice coil actuator is combined with a high-performance guide rail. The coil and stator parts of the motor are non-contact and wear-free, and the force control accuracy of up to ±5 g can be achieved.

High-precision magnetic encoder with micron-level resolution. Optical encoder with 0.1μm resolution, Magnetic grid encoder with 1μm resolution.

The DH-Robotics voice coil actuator is a direct drive motor combined with a micron-level magnetic encoder. When it positions to the same point repeatedly, the accuracy deviation of the stop position is ±2 μm.

The DH-Robotics voice coil actuator is designed to be highly integrated, with a minimum thickness of 10 mm for the series of products, greatly saving the internal space of the module device and facilitating the arrangement of the multi-motor matrix combination.

The intelligent soft landing function enables the target object to be softly touched with precise force control. This technology reduces the scratch rate and fragmentation rate of precision fragile or high unit price parts. In this way, the yield rate and productivity are improved.

PRODUCT ADVANTAGES

±5 g
Force Control Accuracy

0.5 μm
Stroke Resolution

±2 μm
Positioning Repeatability

10 mm
Optimal Thickness

Soft Landing

ADVANTAGES OVER CONVENTIONAL SOLUTION

Take chip packaging as an example:

Pain Points

The conventional chip pickup mechanism contacts the chip too fast, and the contact force is too large, which will cause the chip to be damaged due to excessive pressing. And it cannot achieve high force control, limiting the efficiency of the chip mounting process.

	Conventional Solution	DH-Robotics Solution
Device Used	Combined mounting head	VLAR-20-25 voice coil linear rotary actuator
Motion Module	The module is integrated with: Linear motor Servo motor/stepper motor Voice coil motor (VCM)	All-in-one integrated module design
Repeatability	Positioning repeatability: ±10 μm Rotation repeatability: ±0.5 ° Force control accuracy: ±10 g	Positioning repeatability: ±2 μm ↑ Improved by more than 5 times Rotation repeatability: ±0.02 ° ↑ Improved by more than 10 times Force control accuracy: ±5 g ↑ Improved by more than 2 times

The advantages of DH-Robotics voice coil actuator compared with the common combined mounting head are:

Integrated Design
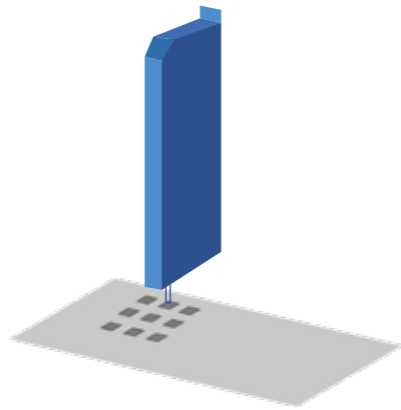**Small Volume**
Saving Device Space

Higher Accuracy
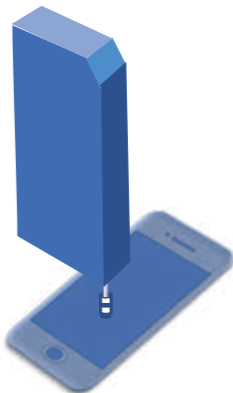**Faster**
More Stable Motion

Precision Component
Less Wear
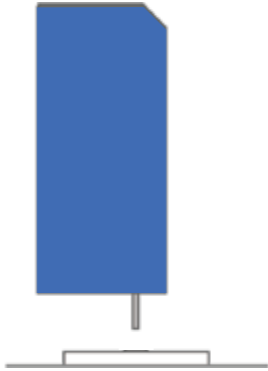**Longer Service Life**

APPLICATIONS

Flexible Pick and Place of Vulnerable Components

The voice coil actuator can provide accurate linear and rotary motions of the Z-axis while performing high-speed pick-and-place motions. With the soft landing function, it can touch precision components with a force of ±5 g to protect the components from damage, for example, in chip packaging and camera module assembly.
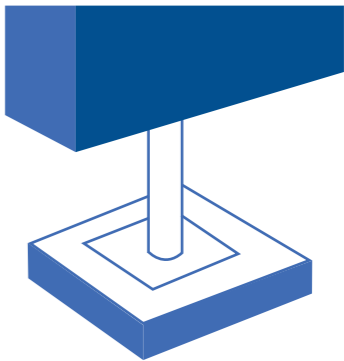
Electronics Testing

Highly integrated design, the minimum thickness can reach 10mm, suitable for multi-motor matrix combination arrangement, and can complete a variety of touch operation modes. The force control accuracy is ±5g, the repeat accuracy (position) is ±2μm, the product runs stably, so that the detection efficiency is improved. It can be applied to touch panel testing, keyboard testing, switch testing.

New Energy Battery Thickness Measurement

The thrust and speed of the actuator are set through the program, and the battery pack is pushed flexibly. When the set force is reached, the position is measured and the thickness information of the battery pack is output. The characteristics of high stability, high frequency and long life of the voice coil actuator can ensure long-term, efficient, accurate and stable execution of detection.

High-precision Parts Assembly

Miniature electronic components have high requirements for production and assembly, such as camera module assembly. The precise force control and soft landing capability of the voice coil linear rotary actuator can prevent parts from being damaged; high position repeatability ensures the accuracy of positioning and assembly and improves the overall assembly production yield.

Q&A

Q：How to quickly select a right Linear coil actuator?

A：Please select the Linear coil actuator according to the "Voice Coil Selection Procedure".

Q：What is the impact of different installation methods of a Linear coil actuator on its use?

A：Vertical installation with the vertical rod pointing down: In general usage scenarios, use the product as recommended. The product performance will not be affected.Horizontal or vertical installation with the vertical rod pointing up: in unconventional usage scenarios, there may be insufficient motor output. You are advised to remove the internal spring to reduce the load weight before use.

Q：What is the relationship between resolution, repeatability, and absolute positioning accuracy?

A：Resolution: refers to the smallest amount of change that the system can detect, that is, the minimum movement distance or minimum rotation angle that each axis of the system can achieve.The resolution directly affects the fine control ability of the system. A high resolution means that the system can more accurately control the motion to a smaller unit.

Positioning repeatability: refers to the consistency and stability that the system can maintain when the same action is repeated several times under the same conditions.The positioning repeatability determines the reliability of the system in dynamic or repeatable actions. A high positioning repeatability means that the system can maintain consistent performance when perform-ing the same action for many times.

Absolute positioning accuracy: refers to how close the actual position of the system is to the ideal target position. This parameter reflects the positioning ability of the system under static conditions.The increase of positioning accuracy usually depends on the mechanical accuracy, electrical accuracy, and the optimization of control algorithm.

Increased resolution can directly improve positioning accuracy, as a higher resolution means the system can more accurately identify and control motion to a smaller unit.However, resolution may not be directly related to positioning accuracy, as the actual positioning accuracy is also affected by mechanical errors, electrical errors, and control algorithms.The positioning repeatability is related to the mechanical structure of the system, the error of the transmission system, the rigidity of the structure, and other factors, which will affect the repeatability of the system.

Q：What is soft landing?

A：In velocity mode, the Linear coil motor controls the robot to approach the surface of an object at low force while continuously monitoring the position error. Once the robot contacts the surface of the object, the motor actuator shaft will remain in the position on the surface of the object when the position error increases to the pre-set value.The purpose of soft landing is to control force properly when the actuator contacts the machining part to prevent device damage or other pressure-induced problems.

Q: What is the force control accuracy of DH-Robotics Linear coil actuator and what factors are related to it?

A: The force control accuracy depends on product specifications. Under the rated load, the open-loop force control accuracy of a conventional linear/rotary actuator is within ±10 g and can be up to ±5 g, and the closed-loop force control accuracy is within ±2 g.The force control accuracy is mainly related to actuator type, load size, running tempo, and controller performance.General-ly speaking, the higher the load, the higher the running tempo, the higher the control difficulty, the lower the force control accuracy. A voice coil is superior to A linear motor, and the higher the controller performance, the higher the force control accuracy.

Q：How does a Linear coil actuator calculate the output according to the cycle time?

A：The output can be calculated according to the following motion plan and formula. For more information, consult the DH-Ro-botics technical support.
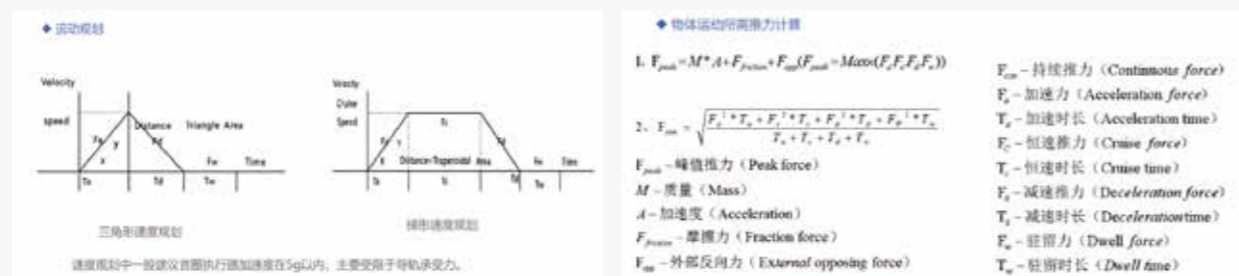
Q：What is the difference between the VLAR series and the DLAR series?

A：These two series are linear/rotary actuators. The VLAR series is driven by a voice coil while the DLAR series is driven by a linear motor. The VLAR series features short stroke, small size, and light weight, while the DLAR series features both short and long stroke and larger size and weight.

Q：How long is the control cable?

A：As standard configurations, cable length options of DH-robotics Linear coil actuator include 3 m, 5 m, 7 m, and 10 m.

Q：Which control modes are supported for Linear coil actuator?

A：The commonly used control modes on the market are supported, such as EtherCAT, Modbus, Canopen and pulse control. However, translation gateways are required for Profinet and CC-Link.

Q：How much radial force can the vertical rod of the actuator withstand?

A：The Linear coil actuator is a precision device and the output end is a high-precision shaft. Therefore, try your best to avoid hard collision in the radial direction.The linear actuator can operates normally under a certain degree of sliding lateral force, and the lateral force is recommended to be less than 2 N.The linear/rotary actuator features a complex internal structure. Do not subject it to lateral force.

Q：What is the diameter of the control cables? What is the bending radius?

A：To minimize signal interference in the actuator, we have divided the control cables into two types: one is the power cable with a diameter of approximately 7mm, and the other is the signal cable with a diameter of approximately 9mm. According to the recommendations from the cable manufacturer, the bending radius requirement for the drag chain of the voice coil actuator control cables is ≥8D, which equals 72mm.
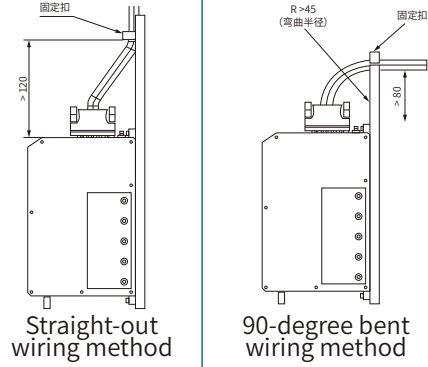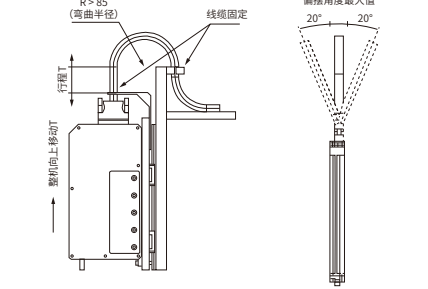
Q：What are the installation requirements for the control cables?
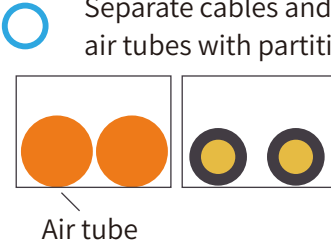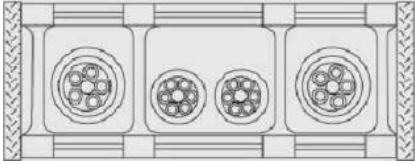
A：As a high-frequency moving component, drag chain cables operate under very stringent conditions. The bending radius of the drag chain must comply with the recommendations from the cable manufacturer. Naturally, a larger bending radius is more beneficial for extending the service life of the cables. The long-term stable operation of drag chain cables depends not only on the quality of the cables and drag chain brackets but also on proper and standardized installation and wiring, which play a decisive role. The installation requirements for control cables can be referred to in the《Voice Coil Actuator Cable Installation Requirements》.

SELECTION PROCEDURE
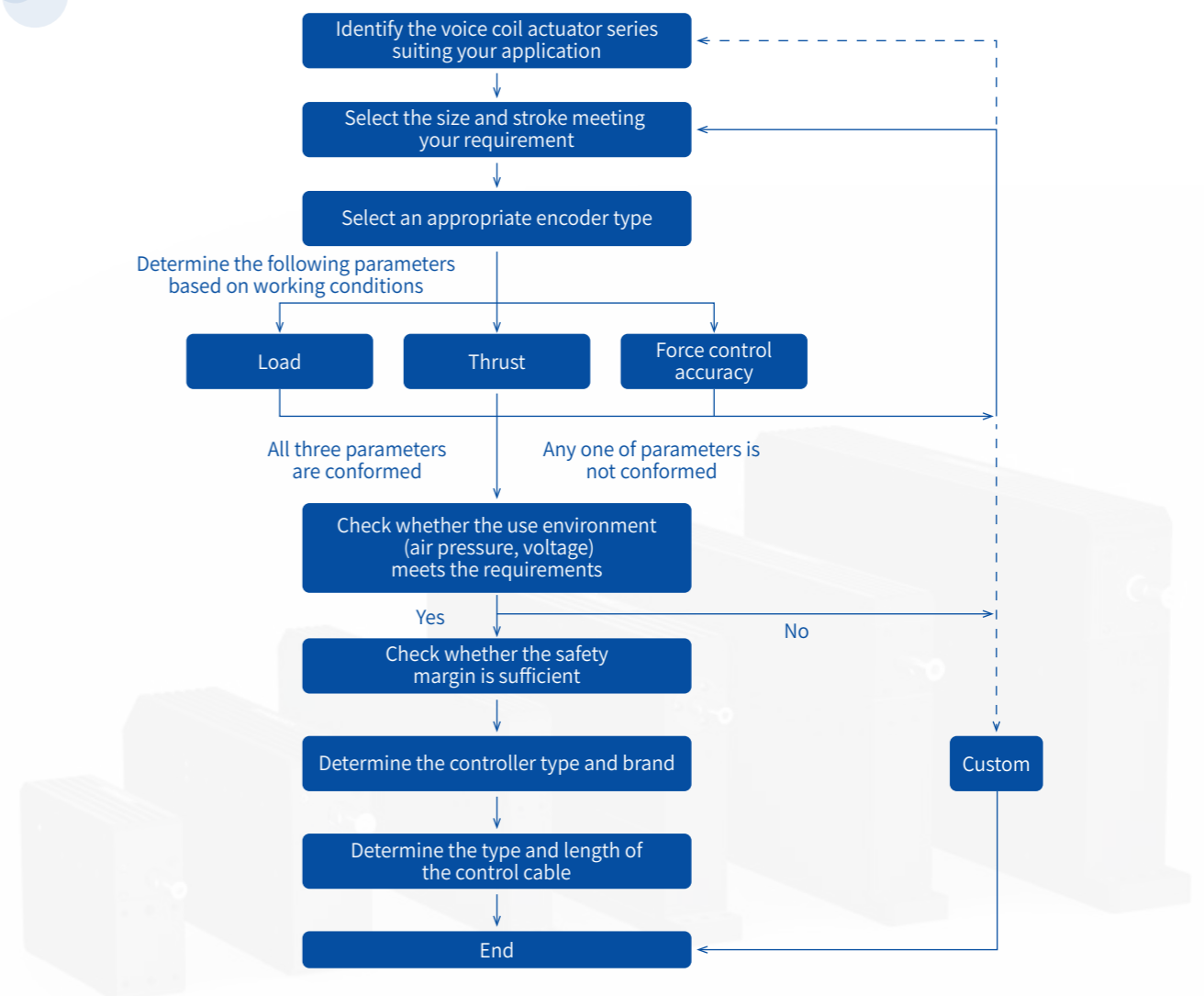
INSTALLATION SPECIFICATIONS FOR LINEAR COIL ACTUATOR CABLES

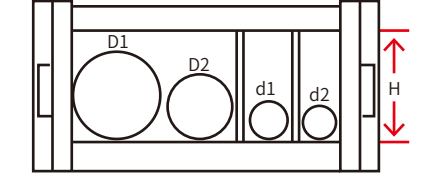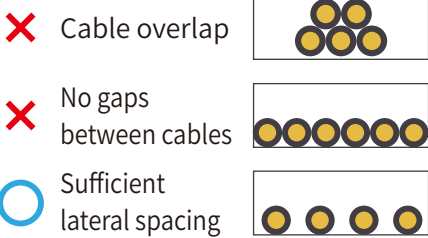| Index Number	Installation Specifications	Illustrative Suggestion	Note
1	When the motor and cable remain stationary relative to each other, the cable can be routed straight out or bent at a 90-degree angle. Ensure that the cable is fixed without excessive tension, bending, or significant swinging. Refer to the recommended diagrams for proper cable fixing.	Straight-out wiring method / 90-degree bent wiring method	/
2	When the motor and cable move relative to each other, allowing the cable to bend, sufficient length must be reserved. At the same time, ensure that the lateral swing of the cable during machine operation is not too large. Refer to the recommended diagrams for proper cable fixing.		Non-standard fixing methods: It is recommended to contact DH technical personnel for evaluation.
3	Both ends of the cable must be fixed when entering or exiting the drag chain. Fixing points should be far from the bending points. The U-shaped plane formed by the natural bending of the cable should align as closely as possible with the U-shaped plane formed by the drag chain's natural curvature. The length of the cables within the drag chain should be appropriate—not too tight or too loose. Refer to the recommended diagrams for the "ideal wiring state."		/
4	If the sum of the diameters of two adjacent cables (D1 + D2) exceeds 1.2 times the inner height (H) of the drag chain bracket, no additional isolation devices are needed between them, as the cables will not entangle. Otherwise, install vertical or horizontal partitions between the adjacent cables to prevent crossover and contact wear.	D1+D2＞1.2H No isolation required d1+d2≤1.2H Isolation required	/
5	To prevent mutual interference, cables must not overlap. When laying cables horizontally within the drag chain, maintain proper spacing with about 10% of the cable diameter left as free space between cables.	✖ Cable overlap ✖ No gaps between cables ◯ Sufficient lateral spacing	

Index Number	Installation Specifications	Illustrative Suggestion	Note
6	If there are air tubes or other rigid cables within the drag chain, install isolation devices between the air tubes and cables to prevent excessive compression and wear on the cables.	◯ Separate cables and air tubes with partitions Air tube	/
7	Cables must not be twisted during installation. Refer to the diagrams for guidance.		/
8	When arranging cables in the drag chain, distribute weight evenly. Avoid situations where one side is significantly heavier than the other. Refer to the recommended diagrams for proper balancing.		/

COMMON CABLE FAILURE MODES AND CAUSES

Index Number	Failure Mode	Common Causes
1	Conductor Breakage	a、Improper length, resulting in severe tension during operation. b、Excessive load. c、Fixing points located within the bending motion range.
2	Twisting and Insulation Damage	Incorrect cable selection with an excessively small bending radius, During bending, the inner side of the cable is compressed, while the outer side is under tension. Over time, excessive stress causes permanent deformation of the material. This creates distinct compression and tension zones in the conductor, leading to twisting.
3	Sheath Wear	Improper installation or incorrect cable selection. Insufficient free space (less than 10% of the cable diameter) between the cable and its surroundings.
4	Shielding Failure/EMC Issues	Typically caused by incorrect shielding angles or mechanical loads, resulting in damage to the shielding layer.

VLA SERIES
Linear Coil Actuator

VLA-10-20 (Vacuum)

VLA-16-15

VLA-16-15 (Vacuum)

VLA-25-25

VLA-30-25

PRODUCT FEATURES

High Force Repeatability Soft Landing	Light, Thin, and Easy to use Adjustable Parameters	High-speed and High Frequency Long life over 100 Million Cycles
The thrust repeatability of VLA series of products is within ±5 g, meeting the production and assembly requirements of semiconductors, optoelectronics, and other industries for high force control accuracy.	The product design is compact, light and thin, and has strong maneuverability. You can adjust the speed, thrust, and position parameters and set different modes through the control software.	With high response-ability, high speed, and high frequency, the frequency can reach more than 30 Hz without load. The service life is up to 100 million cycles, and it is stable and durable.

INSTALLATION METHOD

Install it using the screw holes on the back of the product

Installation Directions:
- Horizontal direction
- Vertical installation with the vertical rod pointing down
- Vertical installation with the vertical rod pointing up
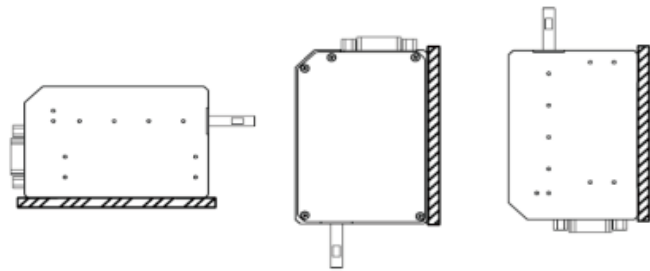
APPLICATION SCENARIOS

The force repeatability of ±5 g, micron-level resolution, and ultra-high motion frequency of the VLA series help to improve the efficiency and yield rate of quick pick-and-place, assembly, testing, and other scenarios in semiconductor, 3C electronics, optoelectronics, and other industries.
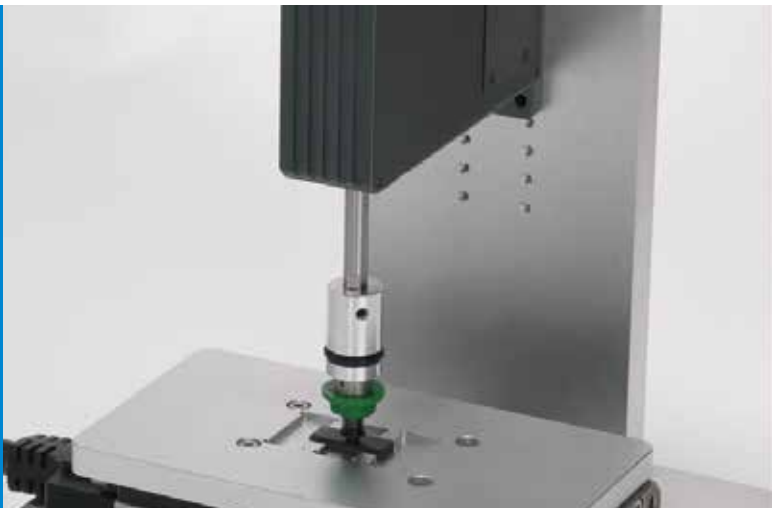
VLA-10-20(Vacuum)

LINEAR COIL ACTUATOR

SELECTION METHOD

Voice Coil Series	Thickness (mm)	Stroke (mm)	Encoder	Voltage (V)	Interface Location/ Vacuum	Customized*
VLA	10	20	M2	24	BV	0

M2	Magnetic encoder, 1 µm

BV	Bottom interface + vacuum

0	No special customization
1	Special customization

*Note: For customization fees, consult the company's sales staff.

TECHNICAL SPECIFICATIONS

Intelligent Feedback

Adjustable Parameters

Long Life

Thrust-displacement curve — 1.0A

Motor thrust (N) vs Stroke position point (mm)
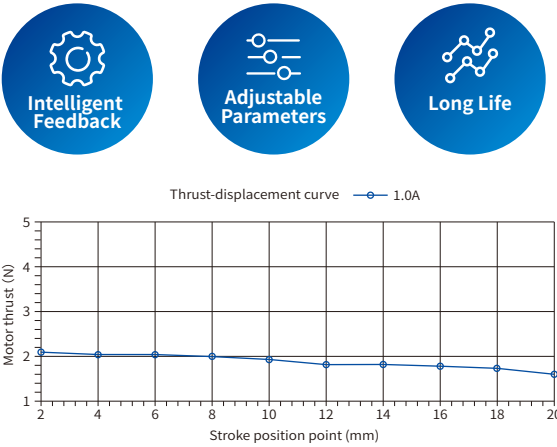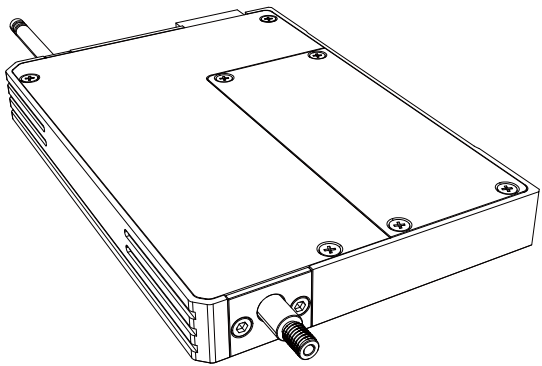
Performance Specifications

Peak thrust	4 N
Continuous thrust*①	1.8 N
Calculation formula for linear shaft motor output (vertically down)*②	$F=2.15-0.027*L$ (For the actual output, refer to the thrust-displacement curve)
Total stroke	20 mm
Maximum speed	0.8 m/s
Force control accuracy*③	30 g ~100 g : ±5 g
Force constant	1.8 N/A
Linear encoder resolution	1 µm (Magnetic encoder)
Linear positioning repeatability	±5 µm

Mechanical Specifications

Overall mass	130 g
Movable part mass	30 g
Size	85 mm x 58 mm x 10 mm
Recommended air pressure range*④	-0.1 Mpa ~ +0.2 Mpa

Operating Environment

Operating voltage	24 V DC ± 10%
Continuous current	1.0 A
Peak current	2.2 A
Recommended load	< 30 g
Maintenance interval	Refer to Maintenance Instructions for DH-Robotics Linear coil actuator
IP rating	IP 40
Recommended operating environment	0~40°C, 85% RH or less
International standard compliance	CE, FCC, RoHS

*① Motor output without protective spring;
*② There is an error of ± 0.3 N between the theoretical calculation formula and the actual condition. For the output calculation of other installation methods, please consult DH-Robotics engineers;
*③ It is the reference value under the recommended load. The actual force control accuracy is related to the load size, running tempo, etc. If you need a higher accuracy, please consult the DH-Robotics technical support;
*④ If the air pressure is beyond the specified range, you can consult DH-Robotics engineers.

Dimensions

2 x M3 Depth 4
Φ3
H7 +0.01 0 Depth 1.5
2xΦ2
0.50
80
69

27 Rod Fully Ext
5 Rod Fully Ret
M3 Male Screw
Φ4 Insertion Of The Windpipe
PHD-2X06P
6
Φ1.50 thru ALL
47 ±0.10
58
2.60
85
10
5
Φ4 h6 0 -0.01

VLA-16-15

LINEAR COIL ACTUATOR

SELECTION METHOD

Voice Coil Series	Thickness (mm)	Stroke (mm)	Encoder	Voltage (V)	Interface Location/ Vacuum	Customized*
VLA	16	15	M2	24	B	0

M2	Magnetic encoder, 1 μm

B	Bottom interface + Without vacuum

0	No special customization
1	Special customization

*Note: For customization fees, consult the company's sales staff.

TECHNICAL SPECIFICATIONS

Intelligent Feedback

Adjustable Parameters

Long Life

Performance Specifications

Peak thrust	6 N
Continuous thrust*[1]	3 N
Calculation formula for linear shaft motor output (vertically down)*[2]	$F=2.60-0.032*L$ (For the actual output, refer to the thrust-displacement curve)
Total stroke	15 mm
Maximum speed	0.7 m/s
Force control accuracy*[3]	30 g ~ 200 g: ±5 g
Force constant	3 N/A
Linear encoder resolution	1 μm(Magnetic encoder)
Linear positioning repeatability	±5 μm

Mechanical Specifications

Overall mass	190 g
Movable part mass	30 g
Size	80 mm x 55 mm x 16 mm
Recommended air pressure range*[4]	Without vacuum

Operating Environment

Operating voltage	24 V DC ±10%
Continuous current	1.0 A
Peak current	2.0 A
Recommended load	< 80 g
Maintenance interval	Refer to Maintenance Instructions for DH-Robotics Linear coil actuator
IP rating	IP 40
Recommended operating environment	0~40°C, 85% RH or less
International standard compliance	CE, FCC, RoHS

*[1] Motor output without protective spring;
*[2] There is an error of ±0.3 N between the theoretical calculation formula and the actual condition. For the output calculation of other installation methods, please consult DH-Robotics engineers;
*[3] It is the reference value under the recommended load. The actual force control accuracy is related to the load size, running tempo, etc. If you need a higher accuracy, please consult the DH-Robotics technical support;
*[4] If the air pressure is beyond the specified range, you can consult DH-Robotics engineers.

Thrust-displacement curve —●— 1.0A

Motor thrust (N) vs Stroke position point (mm)

Dimensions

4xM3 Depth 4
68
5
5
10
H7 +0.01
Ø2.50 0 Depth 3.2
1
4

11.50
5.80
20
Rod Fully Ret
M3 Depth 6
4 x M2.5 Depth 4
38 ±0.1
20
6
55
Ø5 h6 −0.008 / 0
HDP-15P
10
16
80

VLA-16-15 (Vacuum)

LINEAR COIL ACTUATOR

SELECTION METHOD

Voice Coil Series	Thickness (mm)	Stroke (mm)	Encoder	Voltage (V)	Interface Location/ Vacuum	Customized*
VLA	16	15	M2	24	BV	0

M2	Magnetic encoder, 1 μm

BV	Bottom interface + vacuum

0	No special customization
1	Special customization

*Note: For customization fees, consult the company's sales staff.

TECHNICAL SPECIFICATIONS

Intelligent Feedback

Adjustable Parameters

Long Life

Performance Specifications

Performance Specifications	
Peak thrust	6 N
Continuous thrust*①	3 N
Calculation formula for linear shaft motor output (vertically down)*②	$F=2.15-0.027*L$ (For the actual output, refer to the thrust-displacement curve)
Total stroke	15 mm
Maximum speed	0.7 m/s
Force control accuracy*③	30 g ~ 200 g: ±5 g
Force constant	3 N/A
Linear encoder resolution	1 μm(Magnetic encoder)
Linear positioning repeatability	±5 μm

Mechanical Specifications

Mechanical Specifications	
Overall mass	220 g
Movable part mass	30 g
Size	100 mm x 62 mm x 16 mm
Recommended air pressure range*④	-0.1 Mpa ~ +0.2 Mpa

Operating Environment

Operating Environment	
Operating voltage	24 V DC ±10%
Continuous current	1.0 A
Peak current	2.0 A
Recommended load	< 80 g
Maintenance interval	Refer to Maintenance Instructions for DH-Robotics Linear coil actuator
IP rating	IP 40
Recommended operating environment	0~40℃, 85% RH or less
International standard compliance	CE, FCC, RoHS

*① Motor output without protective spring;
*② There is an error of ±0.3 N between the theoretical calculation formula and the actual condition. For the output calculation of other installation methods, please consult DH-Robotics engineers;
*③ It is the reference value under the recommended load. The actual force control accuracy is related to the load size, running tempo, etc. If you need a higher accuracy, please consult the DH-Robotics technical support;
*④ If the air pressure is beyond the specified range, you can consult DH-Robotics engineers.

Thrust-displacement curve — 1.0A

Motor thrust (N) vs Stroke position point (mm)

Dimensions

4xM3 Depth 5
88
5
5
10
2xΦ2.50 H7 +0.01 0 Depth 3.2
4

11.50
M3 Depth 6
4 x M2.5 Depth 4
45 ±0.10
27
6
10
16
5.80
62
Φ7
12
100
20
Rod Fully Ret
Φ5 h6 0 -0.008
HDP-15P
Φ4 Insertion of The Windpipe
7.50
7

Note: The thrust-displacement curve axis values

VLA-25-25

LINEAR COIL ACTUATOR

SELECTION METHOD

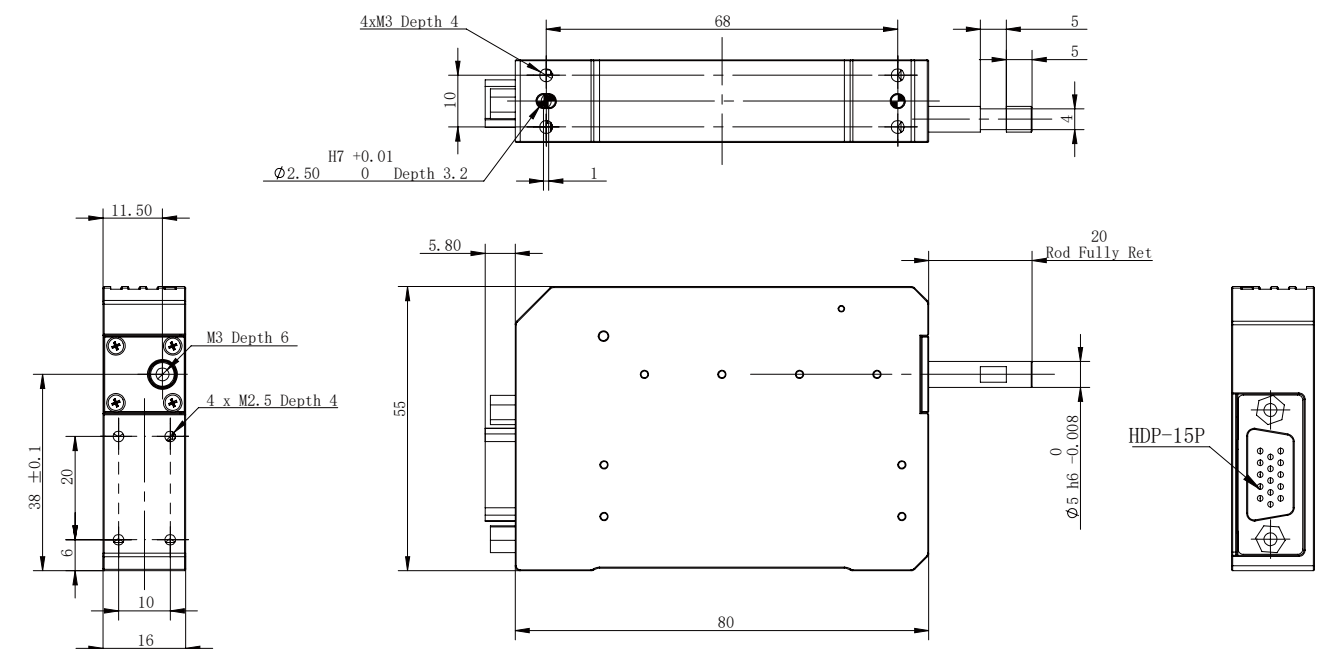| Voice Coil Series	Thickness (mm)	Stroke (mm)	Encoder	Voltage (V)	Interface Location/ Vacuum	Customized*
VLA	25	25	M2	24	B	0

M2	Magnetic encoder, 1 μm

B	Bottom interface + Without vacuum

0	No special customization
1	Special customization

*Note: For customization fees, consult the company's sales staff.

TECHNICAL SPECIFICATIONS

Intelligent Feedback

Adjustable Parameters

Long Life

Thrust-displacement curve — 1.2A

Motor thrust (N) vs Stroke position point (mm)

Performance Specifications

Peak thrust	11 N
Continuous thrust*①	6 N
Calculation formula for linear shaft motor output (vertically down)*②	$F=6.68-0.018*L$ (For the actual output, refer to the thrust-displacement curve)
Total stroke	25 mm
Maximum speed	1 m/s
Force control accuracy*③	100 g ~ 500 g：±5 g
Force constant	5 N/A
Linear encoder resolution	1 μm(Magnetic encoder)
Linear positioning repeatability	±5 μm

Mechanical Specifications

Overall mass	510 g
Movable part mass	54 g
Size	120 mm x 60 mm x 25 mm
Recommended air pressure range*④	Without vacuum

Operating Environment

Operating voltage	24 V DC ±10%
Continuous current	1.2 A
Peak current	2.2 A
Recommended load	< 150 g
Maintenance interval	Refer to Maintenance Instructions for DH-Robotics Linear coil actuator
IP rating	IP 40
Recommended operating environment	0~40°C, 85% RH or less
International standard compliance	CE, FCC, RoHS

*① Motor output without protective spring;
*② There is an error of ±0.3 N between the theoretical calculation formula and the actual condition. For the output calculation of other installation methods, please consult DH-Robotics engineers;
*③ It is the reference value under the recommended load. The actual force control accuracy is related to the load size, running tempo, etc. If you need a higher accuracy, please consult the DH-Robotics technical support;
*④ If the air pressure is beyond the specified range, you can consult DH-Robotics engineers.
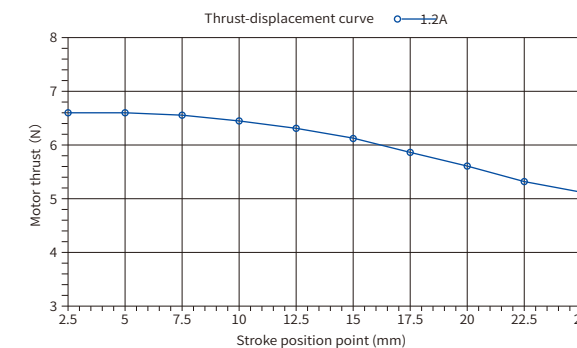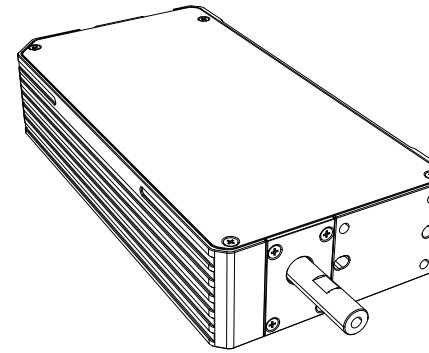
Dimensions

4xM3 Depth 4 108 5 8
18
H7 +0.01
2xØ3   0 Depth 3.2

14.50
M3 Depth 6
H7 +0.01
2xØ3   0 Depth 3.2
42 ±0.10
24
7
18
25
4xM3 Depth 6

5.80
62
120

20
Rod Fully Ret
Ø6 h6 −0.008
HDP-15P

VLA-30-25

LINEAR COIL ACTUATOR

SELECTION METHOD

Voice Coil Series	Thickness (mm)	Stroke (mm)	Encoder	Voltage (V)	Interface Location/ Vacuum	Customized*
VLA	30	25	H1	24U	B	0

H1	Optical encoder, 0.5 µm
M2	Magnetic encoder, 1 µm

24U	24V main with 48V compatibility

B	Bottom interface + Without vacuum

0	No special customization
1	Special customization

*Note: For customization fees, consult the company's sales staff.

TECHNICAL SPECIFICATIONS

Intelligent Feedback   **Adjustable Parameters**   **Long Life**

Thrust-displacement curve — 1.5A

Performance Specifications

Peak thrust	24 N (24 V)	30 N (48 V)
Continuous thrust*①	12 N (24 V)	16 N (48 V)
Calculation formula for linear shaft motor output (vertically down)*②	$F=12.67-0.044*L$	(For the actual output, refer to the thrust-displacement curve)
Total stroke	25 mm	
Maximum speed	1 m/s	
Force control accuracy*③	30 g~100 g: ±5 g 100 g~800 g: ±5%	
Force constant	8 N/A	
Linear encoder resolution	0.5 µm (Optical encoder) 1 µm(Magnetic encoder)	
Linear positioning repeatability	±2 µm (Optical encoder) ± 5µm(Magnetic encoder)	

Mechanical Specifications

Overall mass	860 g
Movable part mass	130 g
Size	140 mm x 75 mm x 30 mm
Recommended air pressure range*④	Without vacuum

Operating Environment

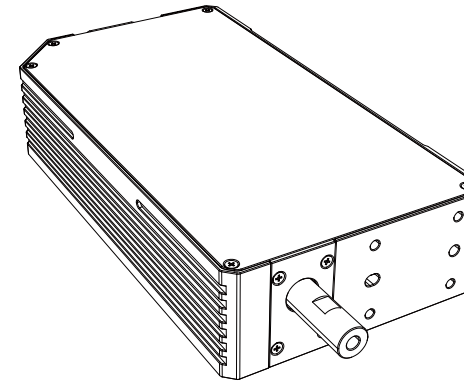|		
Operating voltage	24 V DC ±10 %	
Continuous current	1.5 A (24 V)	2.0 A (48 V)
Peak current	3.0 A (24 V)	4.0 A (48 V)
Recommended load	< 250 g	
Maintenance interval	Refer to Maintenance Instructions for DH-Robotics Linear coil actuator	
IP rating	IP 40	
Recommended operating environment	0~40°C, 85% RH or less	
International standard compliance	CE, FCC, RoHS	

*① Motor output without protective spring;
*② There is an error of ± 0.3 N between the theoretical calculation formula and the actual condition. For the output calculation of other installation methods, please consult DH-Robotics engineers;
*③ It is the reference value under the recommended load. The actual force control accuracy is related to the load size, running tempo, etc. If you need a higher accuracy, please consult the DH-Robotics technical support;
*④ If the air pressure is beyond the specified range, you can consult DH-Robotics engineers.

Dimensions
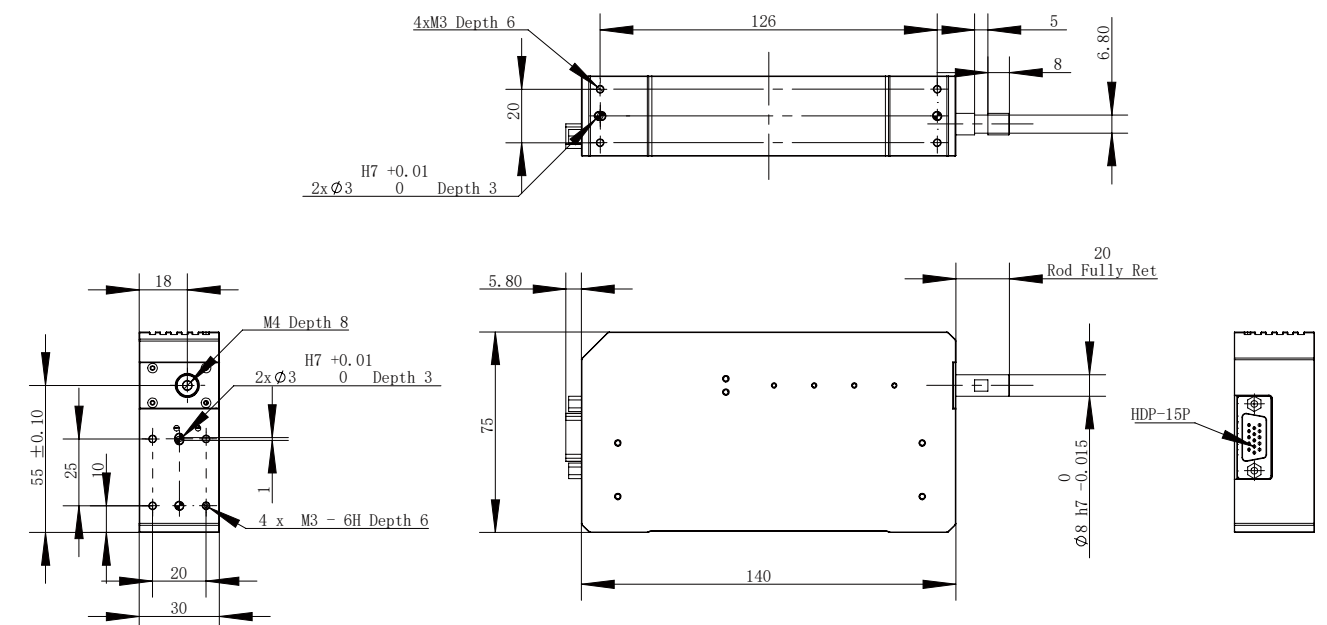
VLAR SERIES
Linear Rotary Coil Actuator

VLAR-20-15
VLAR-20-25
VLAR-25-25

PRODUCT FEATURES

High Performance Linear/Rotary Motion Adjustable Parameters	Hollow Rod Soft Landing Power-off Protection	Precision Resolution Long Life over 100 Million Cycles
Provide accurate linear and rotary actions of the Z-axis during high-speed motion, with adjustable velocity, thrust, and position parameters, enabling complex actions requiring high frequency and high precision.	The product is compact, light, and thin. It employs a hollow rod design to support pick-and-place tasks. The intelligent soft landing function protects the picked and placed workpiece with precise force control. The Z-axis has a built-in spring to prevent the axis from falling off due to power-off during vertical operations.	Regarding this product, the stroke resolution is up to 0.5 μm, the rotary position resolution is 0.005°, and the thrust repeatability is within ±10 g. With high-quality guide rail-level related components, it has a service life of up to 100 million cycles, and it is stable and durable.

INSTALLATION METHOD

Install it using the screw holes on the back of the product.

Installation Directions:
- Horizontal direction
- Vertical installation with the vertical rod pointing down
- Vertical installation with the vertical rod pointing up

APPLICATION SCENARIOS

The force repeatability of ±10 g and the micron-level resolution can be applied to the fast pick-and-place, assembly, testing, and other scenarios in semiconductors, 3C electronics, and other industries.

The unique linear and rotary motions of the Z-axis of the VLAR series can adapt to more abundant industrial scenarios, such as positioning, correction, and assembly in medical automation, 3C, and packaging automation.

VLAR-20-15

LINEAR ROTARY COIL ACTUATOR

SELECTION METHOD

Voice Coil Series	Thickness (mm)	Stroke (mm)	Encoder	Voltage (V)	Interface Location/ Vacuum	Customized*
VLAR	20	15	H1	24	BV	0

H1	Optical encoder, 0.5 μm
M2	Magnetic encoder, 1 μm

BV	Bottom interface + vacuum

0	No special customization
1	Special customization

*Note: For customization fees, consult the company's sales staff.

TECHNICAL SPECIFICATIONS

Intelligent Feedback

Adjustable Parameters

Long Life

Thrust-displacement curve —●— 1.2A

*① Motor output without protective spring;
*② There is an error of ±0.3 N between the theoretical calculation formula and the actual condition. For the output calculation of other installation methods, please consult DH-Robotics engineers;
*③ It is the reference value under the recommended load. The actual force control accuracy is related to the load size, running tempo, etc. If you need a higher accuracy, please consult the DH-Robotics technical support;
*④ If the air pressure is beyond the specified range, you can consult DH-Robotics engineers.

Performance Specifications

Peak thrust	16 N
Continuous thrust*①	8 N
Calculation formula for linear shaft motor output (vertically down)*②	$F=7.17-0.089*L$ (For the actual output, refer to the thrust-displacement curve)
Total stroke	15 mm
Maximum speed	0.7 m/s
Force control accuracy*③	50 g ~ 200 g: ±10 g 200 g ~ 600 g: ±5%
Force constant	6.7 N/A
Maximum torque	0.04 N.M
Rated torque	0.01 N.M
Maximum speed	2000 RPM
Linear encoder resolution	0.5 μm (Optical encoder) 1 μm (Magnetic encoder)
Linear positioning repeatability	±2 μm (Optical encoder) ±5 μm (Magnetic encoder)
Rotary encoder resolution	0.005° (Optical encoder) 0.02° (Magnetic encoder)
Rotary positioning repeatability	±0.02° (Optical encoder) ±0.1° (Magnetic encoder)

Mechanical Specifications

Overall mass	610 g
Movable part mass	176 g
Radial deviation of shaft	0.01 mm
Size	155 mm x 83 mm x 20 mm
Recommended air pressure range*④	-0.1 Mpa ~ +0.2 Mpa

Operating Environment

Operating voltage	24 V DC ±10%
Continuous current	(Linear) 1.2 A (Rotary) 0.6 A
Peak current	(Linear) 2.5 A (Rotary) 2.5 A
Recommended load	< 100 g
Recommended load inertia	10 g.cm²
Maintenance interval	Refer to Maintenance Instructions for DH-Robotics Linear coil actuator
IP rating	IP 40
Recommended operating environment	0~40°C, 85% RH or less
International standard compliance	CE, FCC, RoHS

Dimensions

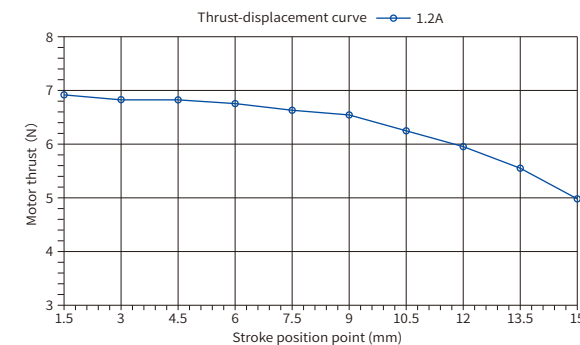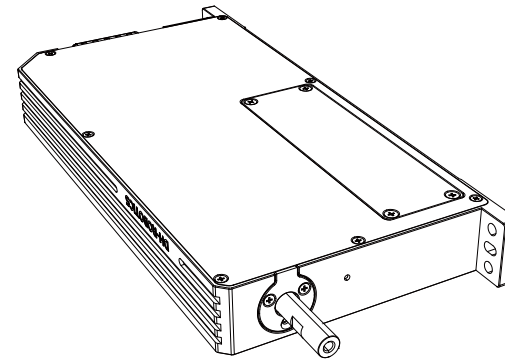# VLAR-20-25

LINEAR ROTARY COIL ACTUATOR

SELECTION METHOD

Voice Coil Series	Thickness (mm)	Stroke (mm)	Encoder	Voltage (V)	Interface Location/ Vacuum	Customized*
VLAR	20	25	H1	24	BV	0

H1	Optical encoder, 0.5 μm
M2	Magnetic encoder, 1 μm

BV	Bottom interface + vacuum

0	No special customization
1	Special customization

*Note: For customization fees, consult the company's sales staff.

TECHNICAL SPECIFICATIONS

Intelligent Feedback   **Adjustable Parameters**   **Long Life**

Thrust-displacement curve — 1.2A

*① Motor output without protective spring;
*② There is an error of ±0.3 N between the theoretical calculation formula and the actual condition. For the output calculation of other installation methods, please consult DH-Robotics engineers;
*③ It is the reference value under the recommended load. The actual force control accuracy is related to the load size, running tempo, etc. If you need a higher accuracy, please consult the DH-Robotics technical support;
*④ If the air pressure is beyond the specified range, you can consult DH-Robotics engineers.

Performance Specifications

Peak thrust	16 N
Continuous thrust*①	8 N
Calculation formula for linear shaft motor output (vertically down)*②	$F=7.77-0.089*L$ (For the actual output, refer to the thrust-displacement curve)
Total stroke	25 mm
Maximum speed	1 m/s
Force control accuracy*③	50 g ~ 200 g：±10 g 200 g ~ 600 g：±5%
Force constant	6.7 N/A
Maximum torque	0.056 N.M
Rated torque	0.014 N.M
Maximum speed	2000 RPM
Linear encoder resolution	0.5 μm (Optical encoder) 1 μm (Magnetic encoder)
Linear positioning repeatability	±2 μm (Optical encoder) ±5 μm (Magnetic encoder)
Rotary encoder resolution	0.005° (Optical encoder) 0.02° (Magnetic encoder)
Rotary positioning repeatability	±0.02° (Optical encoder) ±0.1° (Magnetic encoder)

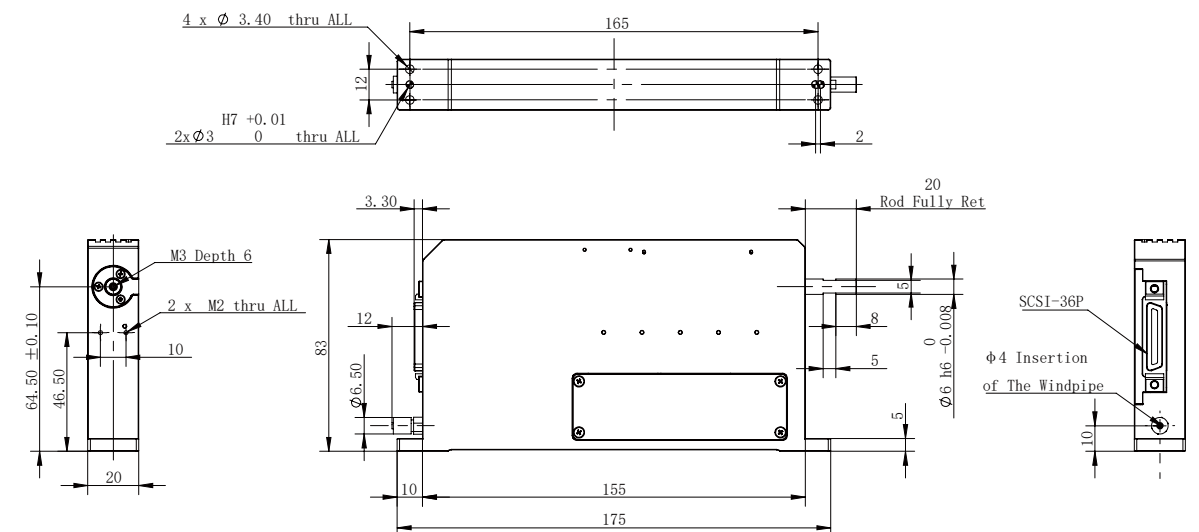### Mechanical Specifications

Overall mass	720 g
Movable part mass	197 g
Radial deviation of shaft	0.01 mm
Size	170 mm x 83 mm x 20 mm
Recommended air pressure range*④	-0.1 Mpa ~ +0.2 Mpa

Operating Environment

Operating voltage	24 V DC ±10%
Continuous current	(Linear) 1.2 A (Rotary) 0.6 A
Peak current	(Linear) 2.5 A (Rotary) 2.5 A
Recommended load	< 100 g
Recommended load inertia	10 g.cm²
Maintenance interval	Refer to Maintenance Instructions for DH-Robotics Linear coil actuator
IP rating	IP 40
Recommended operating environment	0~40°C, 85% RH or less
International standard compliance	CE, FCC, RoHS

Dimensions

VLAR-25-25
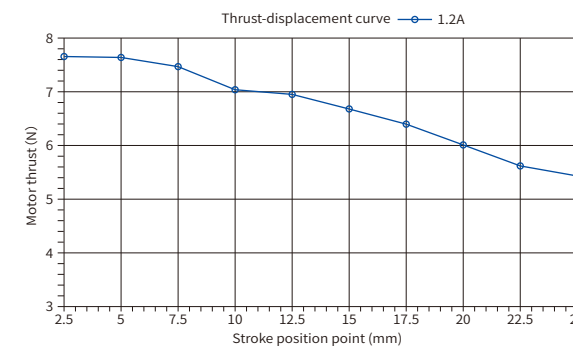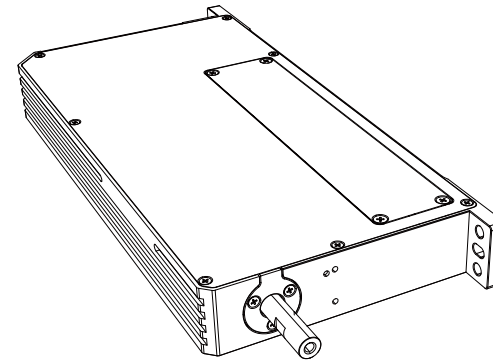
LINEAR ROTARY COIL ACTUATOR

SELECTION METHOD

Voice Coil Series	Thickness (mm)	Stroke (mm)	Encoder	Voltage (V)	Interface Location/ Vacuum	Customized*
VLAR	25	25	H1	24U	BV	0

H1	Optical encoder, 0.5 µm
M2	Magnetic encoder, 1 µm

24U	24V main with 48V compatibility

BV	Bottom interface + vacuum

0	No special customization
1	Special customization

*Note: For customization fees, consult the company's sales staff.

TECHNICAL SPECIFICATIONS

Intelligent Feedback **Adjustable Parameters** **Long Life**

Thrust-displacement curve —o— 1.2A

*① Motor output without protective spring;
*② There is an error of ± 0.3 N between the theoretical calculation formula and the actual condition. For the output calculation of other installation methods, please consult DH-Robotics engineers;
*③ It is the reference value under the recommended load. The actual force control accuracy is related to the load size, running tempo, etc. If you need a higher accuracy, please consult the DH-Robotics technical support;
*④ If the air pressure is beyond the specified range, you can consult DH-Robotics engineers.

Performance Specifications

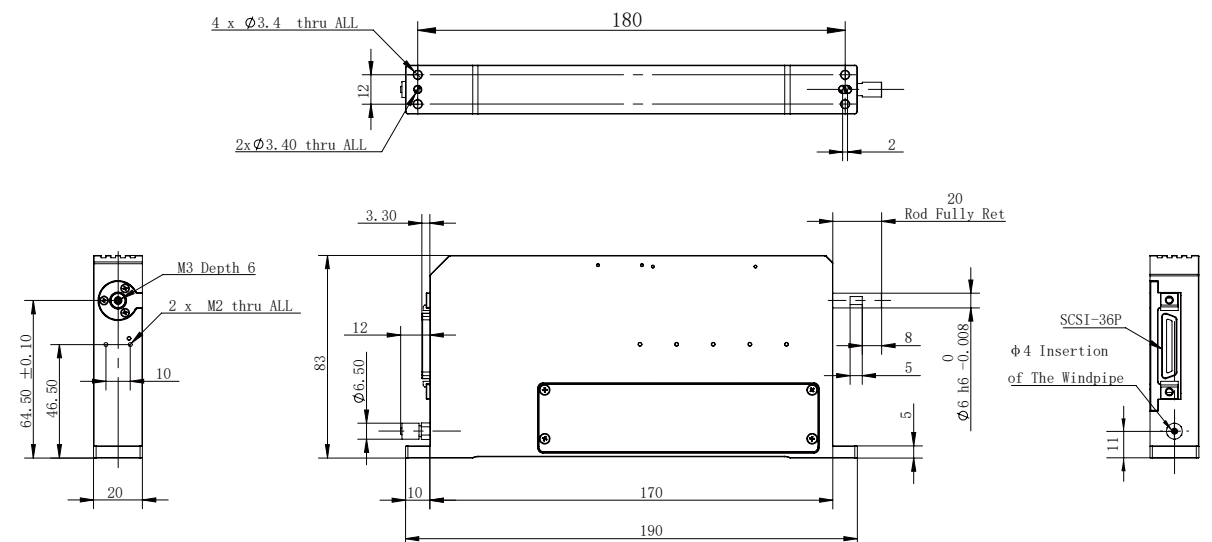|	
Peak thrust	15 N
Continuous thrust*①	8 N
Calculation formula for linear shaft motor output (vertically down)*②	$F=9.384-0.10*L$ (For the actual output, refer to the thrust-displacement curve)
Total stroke	25 mm
Maximum speed	0.7 m/s
Force control accuracy*③	50 g ~ 200g：±10 g 200 g ~ 600g：±5%
Force constant	6.7 N/A
Maximum torque	0.072 N.M
Rated torque	0.025 N.M
Maximum speed	2000 RPM
Linear encoder resolution	0.5 µm (Optical encoder) 1 µm(Magnetic encoder)
Linear positioning repeatability	±2 µm (Optical encoder) ±5 µm(Magnetic encoder)
Rotary encoder resolution	0.005°(Optical encoder) 0.02°(Magnetic encoder)
Rotary positioning repeatability	±0.02°(Optical encoder) ±0.1°(Magnetic encoder)

Mechanical Specifications

Overall mass	1080 g
Movable part mass	280 g
Radial deviation of shaft	0.01 mm
Size	195 mm x 106 mm x 20 mm
Recommended air pressure range*④	-0.1 Mpa ~ +0.2 Mpa

Operating Environment

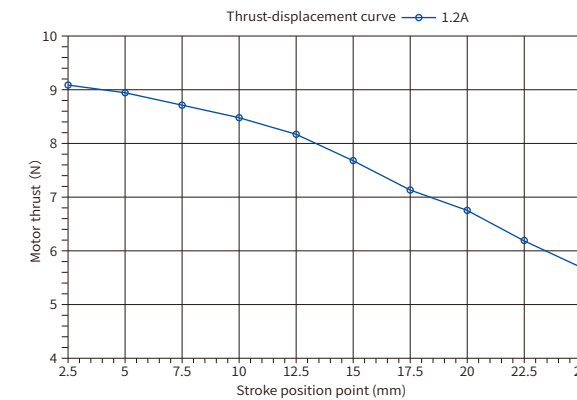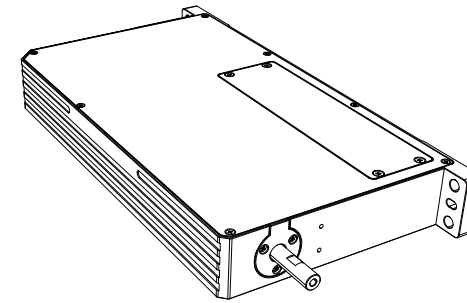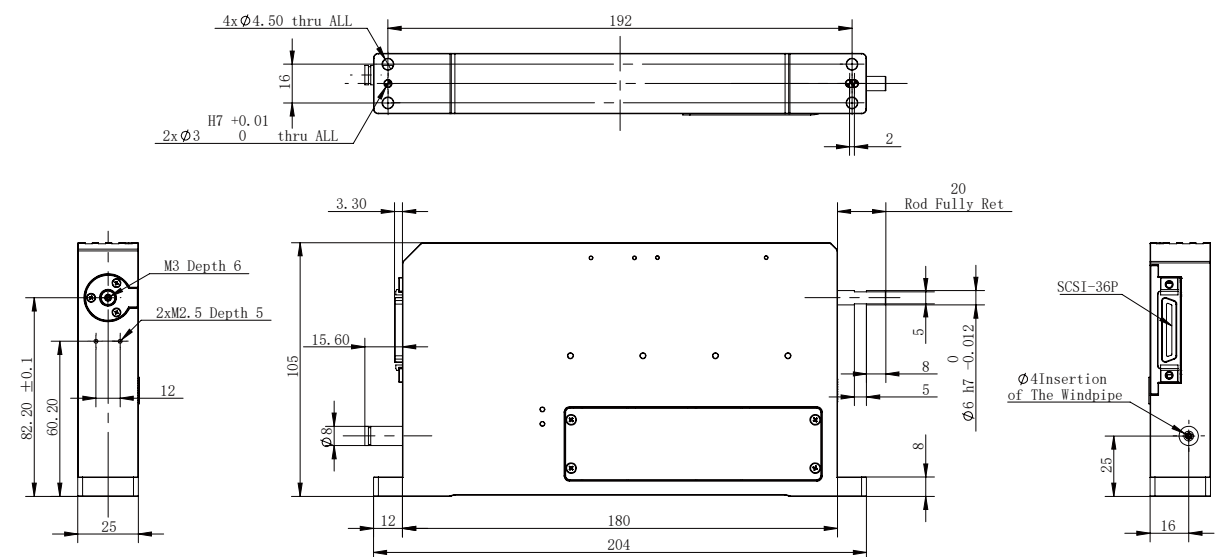|	
Operating voltage	24 V DC ±10%
Continuous current	(Linear) 1.2 A (Rotary) 1 A
Peak current	(Linear) 2.2 A (Rotary) 2.5 A
Recommended load	＜ 150 g
Recommended load inertia	70 g.cm²
Maintenance interval	Refer to Maintenance Instructions for DH-Robotics Linear coil actuator
IP rating	IP 40
Recommended operating environment	0~40°C, 85% RH or less
International standard compliance	CE, FCC, RoHS

Dimensions

DLAR SERIES
Direct Drive Linear Rotary Actuator

DLAR-16-25

DLAR-16-40

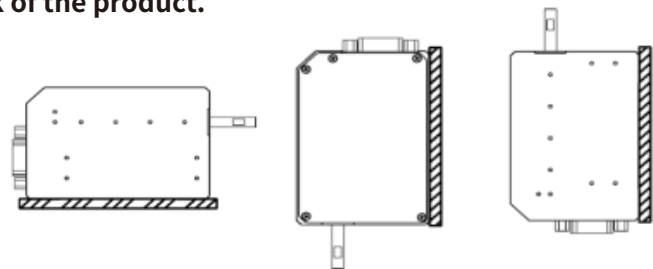DLAR-20-40

DLAR-25-50

DLAR-35-50

PRODUCT FEATURES

High Performance Linear/Rotary Motion Adjustable Parameters	Hollow Rod Soft Landing Power-off Protection	Precision Resolution Long Life over 100 Million Cycles
Provide accurate linear and rotary actions of the Z-axis during high-speed motion, with adjustable velocity, thrust, and position parameters, enabling complex actions requiring high frequency and high precision.	The product is compact, light, and thin. It employs a hollow rod design to support pick-and-place tasks. The intelligent soft landing function protects the picked and placed workpiece with precise force control. The Z-axis has a built-in spring to prevent the axis from falling off due to power-off during vertical operations.	Regarding this product, the stroke resolution is up to 0.5 μm, the rotary position resolution is 0.005°. With high-quality guide rail-level related components, it has a service life of up to 100 million cycles, and it is stable and durable.

INSTALLATION METHOD

Install it using the screw holes on the back of the product.

Installation Directions:

- Horizontal direction
- Vertical installation with the vertical rod pointing down
- Vertical installation with the vertical rod pointing up

APPLICATION SCENARIOS

The force repeatability of ±10 g and the micron-level resolution can be applied to the fast pick-and-place, assembly, testing, and other scenarios in semiconductors, 3C electronics, and other industries.

The unique linear and rotary motions of the Z-axis of the VLAR series can adapt to more abundant industrial scenarios, such as positioning, correction, and assembly in medical automation, 3C, and packaging automation.

DLAR-16-25

DIRECT DRIVE LINEAR ROTARY ACTUATOR

SELECTION METHOD

Voice Coil Series	Thickness (mm)	Stroke (mm)	Encoder	Voltage (V)	Interface Location/ Vacuum	Customized*
DLAR	16	25	H1	24U	BV	0

H1	Optical encoder, 0.5 μm
M2	Magnetic encoder, 1 μm

24U	24V main with 48V compatibility

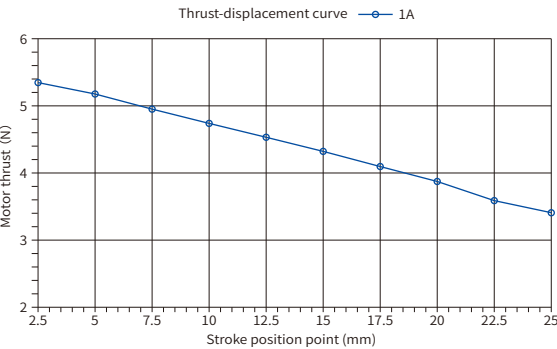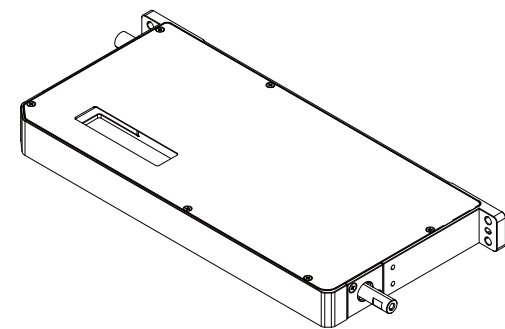| BV	Bottom interface + vacuum

0	No special customization
1	Special customization

*Note: For customization fees, consult the company's sales staff.

TECHNICAL SPECIFICATIONS

Performance Specifications

Peak thrust	15 N
Continuous thrust* [1]	6 N
Calculation formula for linear shaft motor output (vertically down)* [2]	F=5.68-0.089*L (For the actual output, refer to the thrust-displacement curve)
Total stroke	25 mm
Maximum speed	1 m/s
Force control accuracy* [3]	50 g ~ 200 g: ±10 g 200 g ~ 400 g: ±5%
Force constant	6 N/A
Maximum torque	0.056 N.M
Rated torque	0.014 N.M
Maximum speed	2000 RPM
Linear encoder resolution	0.5 μm (Optical encoder) 1 μm(Magnetic encoder)
Linear positioning repeatability	±2 μm (Optical encoder) ±5 μm(Magnetic encoder)
Rotary encoder resolution	0.005° (Optical encoder) 0.02°(Magnetic encoder)
Rotary positioning repeatability	±0.02° (Optical encoder) ±0.1°(Magnetic encoder)

Mechanical Specifications

Overall mass	583 g
Movable part mass	150 g
Radial deviation of shaft	0.01 mm
Size	180 mm x 90 mm x 16.8 mm
Recommended air pressure range* [4]	-0.1 Mpa ~ +0.2 Mpa

Operating Environment

Operating voltage	24 V DC ±10%
Continuous current	(Linear) 1.0 A (Rotary) 0.6 A
Peak current	(Linear) 2.5 A (Rotary) 2.5 A
Recommended load	< 100 g
Recommended load inertia	10 g.cm²
Maintenance interval	Refer to Maintenance Instructions for DH-Robotics Linear coil actuator
IP rating	IP 40
Recommended operating environment	0~40°C, 85% RH or less
International standard compliance	CE, FCC, RoHS

Intelligent Feedback **Adjustable Parameters** **Long Life**

Thrust-displacement curve — 1A

Motor thrust (N) vs Stroke position point (mm)

*[1] Motor output without protective spring;
*[2] There is an error of ±0.3 N between the theoretical calculation formula and the actual condition. For the output calculation of other installation methods, please consult DH-Robotics engineers;
*[3] It is the reference value under the recommended load. The actual force control accuracy is related to the load size, running tempo, etc. If you need a higher accuracy, please consult the DH-Robotics technical support;
*[4] If the air pressure is beyond the specified range, you can consult DH-Robotics engineers.

Dimensions

4x Ø3.30 thru ALL
190
2x Ø2 H7 +0.01 0 thru ALL
15 Rod Fully Ret
1
SCSI-36P
Ø4 Insertion of The Windpipe
M3 Depth 6
2xM2.5 Depth 4
Ø6 h7 -0.01 0
3.30
3 5
69 ±0.10
53.50
8
90
12
16.80
10
180
200

DLAR-16-40

DIRECT DRIVE LINEAR ROTARY ACTUATOR

SELECTION METHOD

Voice Coil Series	Thickness (mm)	Stroke (mm)	Encoder	Voltage (V)	Interface Location/ Vacuum	Customized*
DLAR	16	40	H1	24U	BV	0

H1	Optical encoder, 0.5 μm
M2	Magnetic encoder, 1 μm

24U	24V main with 48V compatibility

BV	Bottom interface + vacuum

0	No special customization
1	Special customization

*Note: For customization fees, consult the company's sales staff.

TECHNICAL SPECIFICATIONS

Intelligent Feedback   **Adjustable Parameters**   **Long Life**

Thrust-displacement curve — 1.0A

Motor thrust (N) vs Stroke position point (mm)

*① Motor output without protective spring;
*② There is an error of ±0.3 N between the theoretical calculation formula and the actual condition. For the output calculation of other installation methods, please consult DH-Robotics engineers;
*③ It is the reference value under the recommended load. The actual force control accuracy is related to the load size, running tempo, etc. If you need a higher accuracy, please consult the DH-Robotics technical support;
*④ If the air pressure is beyond the specified range, you can consult DH-Robotics engineers.

Performance Specifications

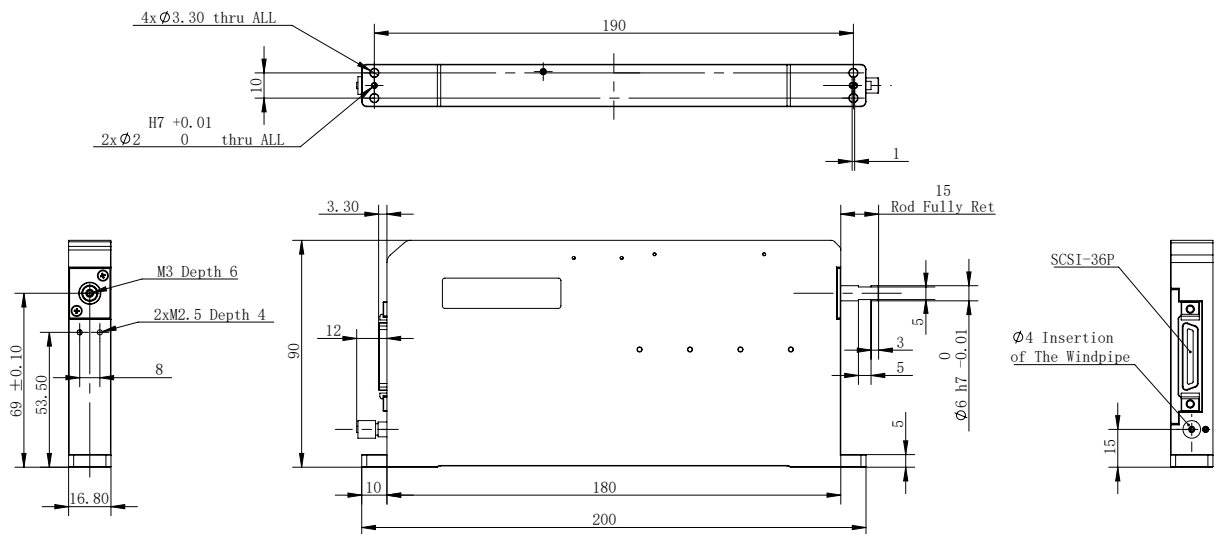|	
Peak thrust	15 N
Continuous thrust* ①	6 N
Calculation formula for linear shaft motor output (vertically down)*②	$F=6.31-0.089*L$ (For the actual output, refer to the thrust-displacement curve)
Total stroke	40 mm
Maximum speed	1.3 m/s
Force control accuracy*③	50 g ~ 200 g：±10 g 200 g ~ 400 g：±5%
Force constant	6 N/A
Maximum torque	0.056 N.M
Rated torque	0.014 N.M
Maximum speed	2000 RPM
Linear encoder resolution	0.5 μm (Optical encoder) 1 μm (Magnetic encoder)
Linear positioning repeatability	±2 μm (Optical encoder) ±5 μm (Magnetic encoder)
Rotary encoder resolution	0.005° (Optical encoder) 0.02° (Magnetic encoder)
Linear positioning repeatability	±0.02° (Optical encoder) ±0.1° (Magnetic encoder)

Mechanical Specifications

Overall mass	660 g
Movable part mass	170 g
Radial deviation of shaft	0.015 mm
Size	195 mm x 90 mm x16.8 mm
Recommended air pressure range*④	-0.1 Mpa ~ +0.2 Mpa

Operating Environment
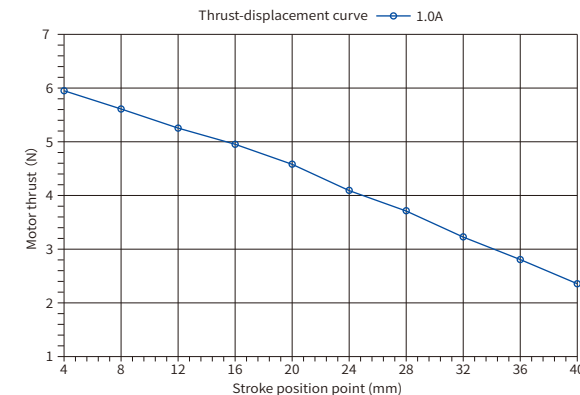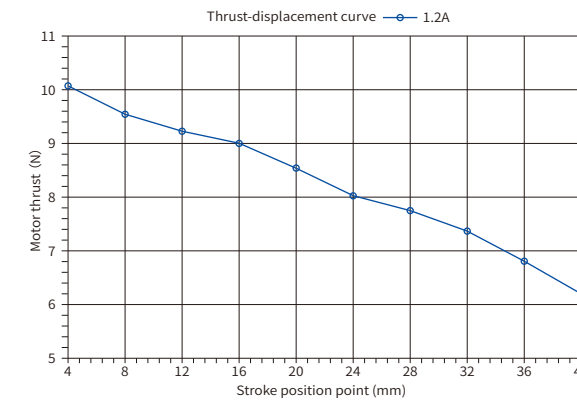
Operating voltage	24 V DC ±10%
Continuous current	(Linear) 1 A (Rotary) 0.6 A
Peak current	(Linear) 2.5 A (Rotary) 2.5 A
Recommended load	＜ 100 g
Recommended load inertia	10 g.cm²
Maintenance interval	Refer to Maintenance Instructions for DH-Robotics Linear coil actuator
IP rating	IP 40
Recommended operating environment	0~40°C, 85% RH or less
International standard compliance	CE, FCC, RoHS

Dimensions

4x Ø3.30 thru ALL
205
H7 +0.01
2x Ø2 0 thru ALL
15 Rod Fully Ret
3.30
M3 Depth 6
2xM2.5 Depth 4
Ø4 Insertion of The Windpipe
SCSI-36P
Ø6 h7 −0.01
69 ±0.10
53.50
16.80
8
12
90
10
195
215

DLAR-20-40

DIRECT DRIVE LINEAR ROTARY ACTUATOR

SELECTION METHOD

Voice Coil Series	Thickness (mm)	Stroke (mm)	Encoder	Voltage (V)	Interface Location/ Vacuum	Customized*
DLAR	20	40	H1	24U	BV	0

H1	Optical encoder, 0.5 μm
M2	Magnetic encoder, 1 μm

24U	24V main with 48V compatibility

BV	Bottom interface + vacuum

0	No special customization
1	Special customization

*Note: For customization fees, consult the company's sales staff.

TECHNICAL SPECIFICATIONS

- Intelligent Feedback
- Adjustable Parameters
- Long Life

Thrust-displacement curve — 1.2A

Motor thrust (N) vs Stroke position point (mm)

*① Motor output without protective spring;
*② There is an error of ±0.3 N between the theoretical calculation formula and the actual condition. For the output calculation of other installation methods, please consult DH-Robotics engineers;
*③ It is the reference value under the recommended load. The actual force control accuracy is related to the load size, running tempo, etc. If you need a higher accuracy, please consult the DH-Robotics technical support;
*④ If the air pressure is beyond the specified range, you can consult DH-Robotics engineers.

Performance Specifications

Peak thrust	30 N
Continuous thrust* ①	10.5 N
Calculation formula for linear shaft motor output (vertically down)*②	$F=10.53-0.10*L$ (For the actual output, refer to the thrust-displacement curve)
Total stroke	40 mm
Maximum speed	1.8 m/s
Force control accuracy*③	50 g ~ 200 g：±10 g 200 g ~ 800 g：±5%
Force constant	8.7 N/A
Maximum torque	0.056 N.M
Rated torque	0.014 N.M
Maximum speed	2000 RPM
Linear encoder resolution	0.5 μm (Optical encoder) 1 μm(Magnetic encoder)
Linear positioning repeatability	±2 μm (Optical encoder) ±5 μm(Magnetic encoder)
Rotary encoder resolution	0.005° (Optical encoder) 0.02°(Magnetic encoder)
Rotary positioning repeatability	±0.02° (Optical encoder) ±0.1°(Magnetic encoder)

Mechanical Specifications

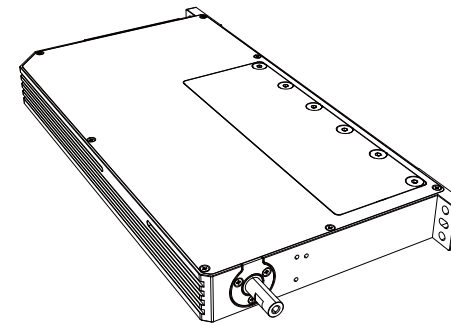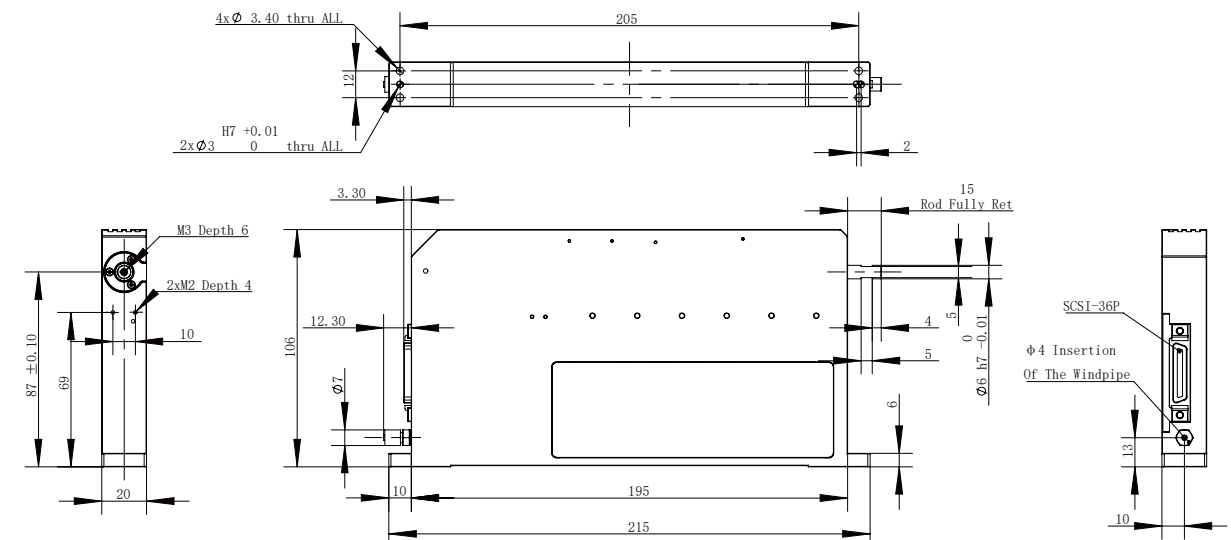|	
Overall mass	1100 g
Movable part mass	180 g
Radial deviation of shaft	0.015 mm
Size	195 mm x 106 mm x 20 mm
Recommended air pressure range*④	-0.1 Mpa ~ +0.2 Mpa

Operating Environment

Operating voltage	24 V DC ±10%
Continuous current	(Linear) 1.2 A (Rotary) 0.6 A
Peak current	(Linear) 3.5 A (Rotary) 2.5 A
Recommended load	＜100 g
Recommended load inertia	10 g.cm²
Maintenance interval	Refer to Maintenance Instructions for DH-Robotics Linear coil actuator
IP rating	IP 40
Recommended operating environment	0~40°C, 85% RH or less
International standard compliance	CE, FCC, RoHS

Dimensions

DLAR-25-50

DIRECT DRIVE LINEAR ROTARY ACTUATOR

SELECTION METHOD

Voice Coil Series	Thickness (mm)	Stroke (mm)	Encoder	Voltage (V)	Interface Location/ Vacuum	Customized*
DLAR	25	50	H1	24U	BV	0

H1	Optical encoder, 0.5 μm
M2	Magnetic encoder, 1 μm

24U	24V main with 48V compatibility

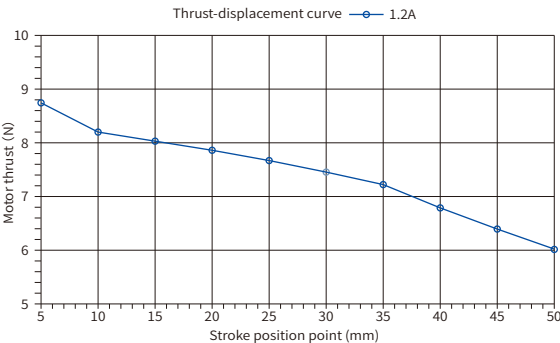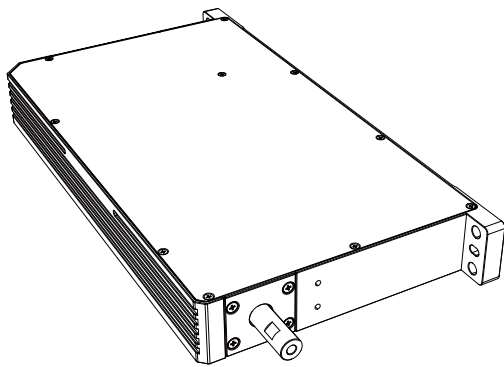| BV	Bottom interface + vacuum

0	No special customization
1	Special customization

*Note: For customization fees, consult the company's sales staff.

TECHNICAL SPECIFICATIONS

Intelligent Feedback　　Adjustable Parameters　　Long Life

Thrust-displacement curve — 1.2A

*① Motor output without protective spring;
*② There is an error of ±0.3 N between the theoretical calculation formula and the actual condition. For the output calculation of other installation methods, please consult DH-Robotics engineers;
*③ It is the reference value under the recommended load. The actual force control accuracy is related to the load size, running tempo, etc. If you need a higher accuracy, please consult the DH-Robotics technical support;
*④ If the air pressure is beyond the specified range, you can consult DH-Robotics engineers.

Performance Specifications

Peak thrust	26 N	
Continuous thrust* ①	8 N	
Calculation formula for linear shaft motor output (vertically down)*②	F=8.80-0.056*L	(For the actual output, refer to the thrust-displacement curve)
Total stroke	50 mm	
Maximum speed	1.6 m/s	
Force control accuracy*③	50 g ~ 200 g：±10 g 200 g ~ 600 g：±5%	
Force constant	6.6 N/A	
Maximum torque	0.056 N.M	
Rated torque	0.02 N.M	
Maximum speed	2000 RPM	
Linear encoder resolution	0.5 μm (Optical encoder)	1 μm (Magnetic encoder)
Linear positioning repeatability	±2 μm (Optical encoder)	±5 μm (Magnetic encoder)
Rotary encoder resolution	0.005° (Optical encoder)	0.02° (Magnetic encoder)
Rotary positioning repeatability	±0.02° (Optical encoder)	±0.1° (Magnetic encoder)

Mechanical Specifications

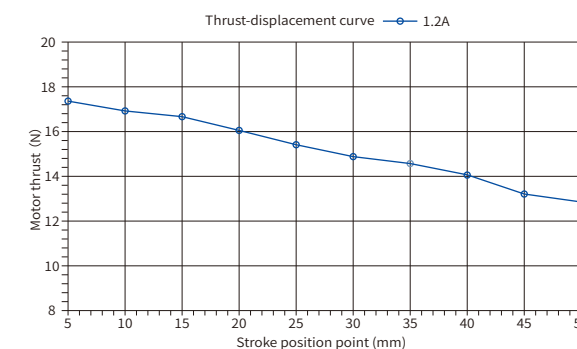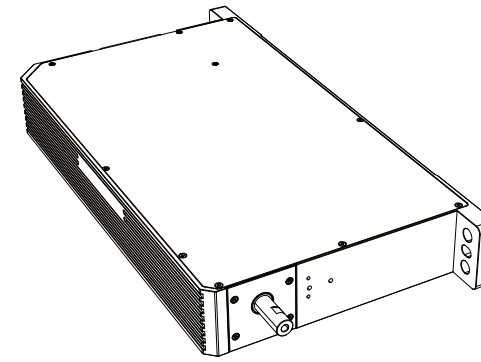| Overall mass	1170 g
Movable part mass	245 g
Radial deviation of shaft	0.015 mm
Size	200 mm x 115 mm x 25 mm
Recommended air pressure range* ④	-0.1 Mpa ~ +0.2 Mpa

Operating Environment

Operating voltage	24 V DC ±10%
Continuous current	(Linear) 1.2 A　(Rotary) 1.0 A
Peak current	(Linear) 4 A　(Rotary) 2.8 A
Recommended load	＜ 150 g
Recommended load inertia	20 g.cm²
Maintenance interval	Refer to Maintenance Instructions for DH-Robotics Linear coil actuator
IP rating	IP 40
Recommended operating environment	0~40°C, 85% RH or less
International standard compliance	CE, FCC, RoHS

Dimensions

DLAR-35-50

DIRECT DRIVE LINEAR ROTARY ACTUATOR

SELECTION METHOD

Voice Coil Series	Thickness (mm)	Stroke (mm)	Encoder	Voltage (V)	Interface Location/ Vacuum	Customized*
DLAR	35	50	H1	48	BV	0

H1	Optical encoder, 0.5 μm
M2	Magnetic encoder, 1 μm

BV	Bottom interface + vacuum

0	No special customization
1	Special customization

*Note: For customization fees, consult the company's sales staff.

TECHNICAL SPECIFICATIONS

Intelligent Feedback **Adjustable Parameters** **Long Life**

Performance Specifications

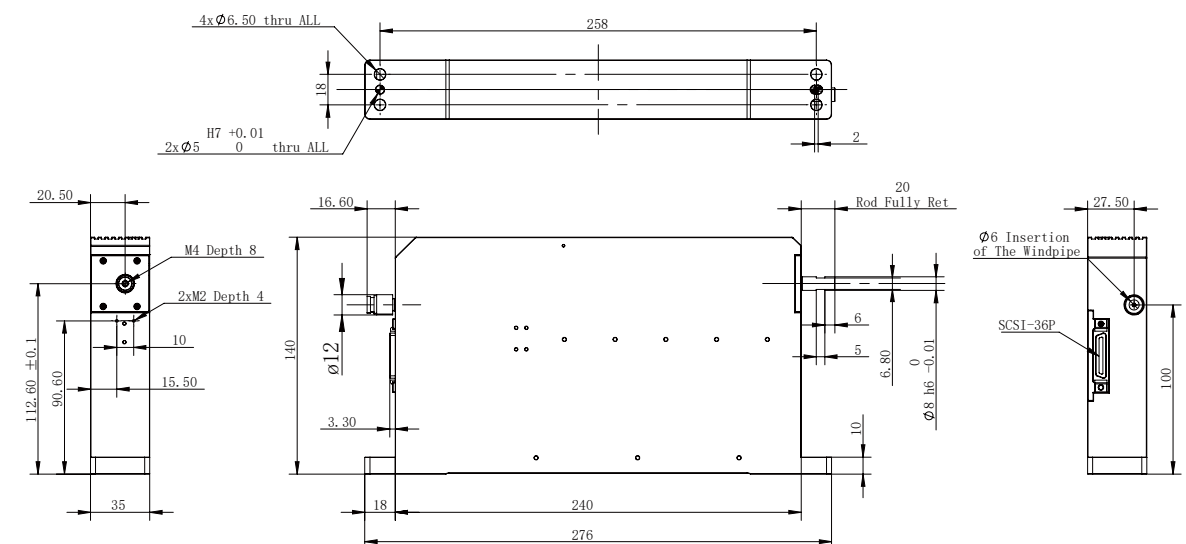|	
Peak thrust	60 N
Continuous thrust* ①	18 N
Calculation formula for linear shaft motor output (vertically down)*②	$F=17.71-0.09*L$ (For the actual output, refer to the thrust-displacement curve)
Total stroke	50 mm
Maximum speed	1.6 m/s
Force control accuracy*③	80 g ~ 200 g: ±10 g 200 g ~ 1200 g: ±5%
Force constant	15 N/A
Maximum torque	0.19 N.M
Rated torque	0.095 N.M
Maximum speed	5000 RPM
Linear encoder resolution	0.5 μm (Optical encoder) 1 μm(Magnetic encoder)
Linear positioning repeatability	±2 μm (Optical encoder) ±5 μm(Magnetic encoder)
Rotary encoder resolution	17 BIT (Absolute value of a single coil)
Rotary positioning repeatability	±0.01°

Mechanical Specifications

Overall mass	2415 g
Movable part mass	500 g
Radial deviation of shaft	0.015 mm
Size	240 mm x 140 mm x 35 mm
Recommended air pressure range*④	-0.1 Mpa ~ +0.2 Mpa

Operating Environment

Operating voltage	48 V DC ±10 %
Continuous current	(Linear) 1.2 A (Rotary) 0.6 A
Peak current	(Linear) 3.5 A (Rotary) 2.5 A
Recommended load	＜ 300 g
Recommended load inertia	120 g.cm²
Maintenance interval	Refer to Maintenance Instructions for DH-Robotics Linear coil actuator
IP rating	IP 40
Recommended operating environment	0~40°C, 85% RH or less
International standard compliance	CE, FCC, RoHS

Thrust-displacement curve —●— 1.2A

*① Motor output without protective spring;
*② There is an error of ±0.3 N between the theoretical calculation formula and the actual condition. For the output calculation of other installation methods, please consult DH-Robotics engineers;
*③ It is the reference value under the recommended load. The actual force control accuracy is related to the load size, running tempo, etc. If you need a higher accuracy, please consult the DH-Robotics technical support;
*④ If the air pressure is beyond the specified range, you can consult DH-Robotics engineers.

Dimensions

DLSR SERIES
Direct Drive Linear Rotary Actuator
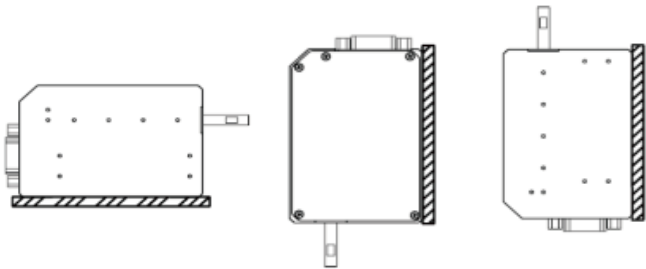
DLSR-25-50

PRODUCT FEATURES

High Performance Linear/Rotary Motion Adjustable Parameters	Hollow Rod Soft Landing Power-off Protection	Precision Resolution Long Life over 100 Million Cycles
Provide accurate linear and rotary actions of the Z-axis during high-speed motion, with adjustable velocity, thrust, and position parameters, enabling complex actions requiring high frequency and high precision.	The product is compact, light, and thin. It employs a hollow rod design to support pick-and-place tasks. The intelligent soft landing function protects the picked and placed workpiece with precise force control. The Z-axis has a built-in spring to prevent the axis from falling off due to power-off during vertical operations.	Regarding this product, the stroke resolution is up to 0.5 µm, the rotary position resolution is 0.005°. With high-quality guide rail-level related components, it has a service life of up to 100 million cycles, and it is stable and durable.

INSTALLATION METHOD

Install it using the screw holes on the back of the product.

Installation directions:
- Horizontal direction
- Vertical installation with the vertical rod pointing down
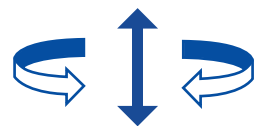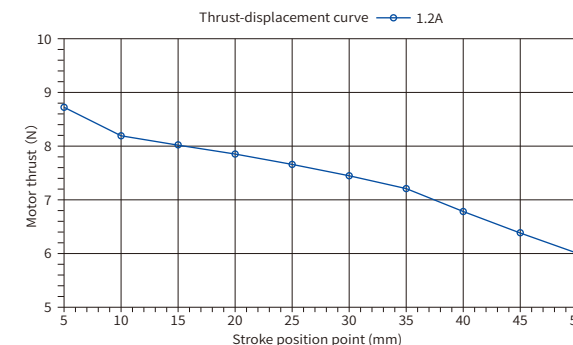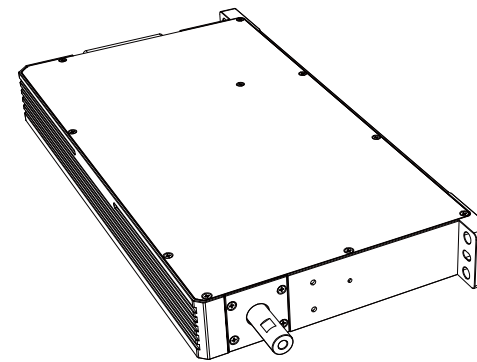- Vertical installation with the vertical rod pointing up

APPLICATION SCENARIOS

DLSR features linear and rotary motion plus ± 0.1 N force repeatability, and can be applied in assembly and bonding of 3C products, automatic transplanting, handling, etc.

DLSR-25-50

DIRECT DRIVE LINEAR ROTARY ACTUATOR

SELECTION METHOD

Voice Coil Series	Thickness (mm)	Stroke (mm)	Encoder	Voltage (V)	Interface Location/ Vacuum	Customized*
DLSR	25	50	H1	24U	BV	0

H1	Optical encoder, 0.5 μm
M2	Magnetic encoder, 1 μm

24U	24V main with 48V compatibility

BV	Bottom interface + vacuum

0	No special customization
1	Special customization

*Note: For customization fees, consult the company's sales staff.

TECHNICAL SPECIFICATIONS

Intelligent Feedback **Adjustable Parameters** **Long Life**

Thrust-displacement curve — 1.2A
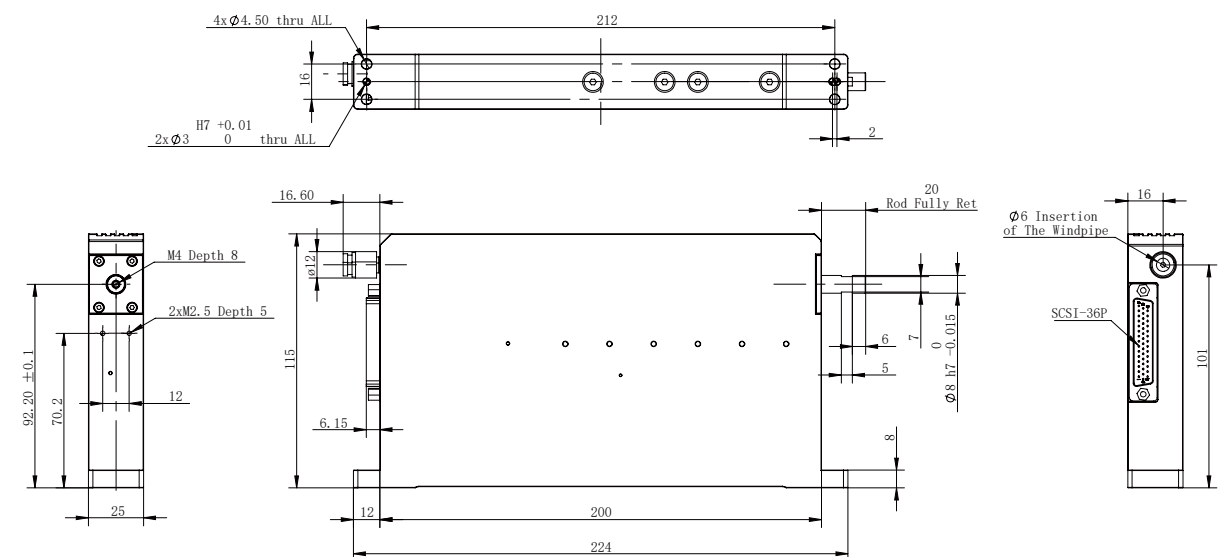

*① Motor output without protective spring;
*② There is an error of ±0.3 N between the theoretical calculation formula and the actual condition. For the output calculation of other installation methods, please consult DH-Robotics engineers;
*③ It is the reference value under the recommended load. The actual force control accuracy is related to the load size, running tempo, etc. If you need a higher accuracy, please consult the DH-Robotics technical support;
*④ If the air pressure is beyond the specified range, you can consult DH-Robotics engineers.

Performance Specifications

Peak thrust	26 N
Continuous thrust*①	8 N
Calculation formula for linear shaft motor output (vertically down)*②	$F=8.80-0.056*L$ (For the actual output, refer to the thrust-displacement curve)
Total stroke	50 mm
Maximum speed	1.6 m/s
Force control accuracy*③	50 g ~ 200 g: ±10 g 200 g ~ 600 g: ±5%
Force constant	6.6 N/A
Holding torque	0.03 N.M
Maximum speed	800 RPM
Linear encoder resolution	0.5 μm (Optical encoder) 1 μm (Magnetic encoder)
Linear positioning repeatability	±2 μm (Optical encoder) ±5 μm (Magnetic encoder)
Rotary encoder resolution	2000 lines
Rotary positioning repeatability	±0.1°

Mechanical Specifications

Overall mass	1170 g
Movable part mass	245 g
Radial deviation of shaft	0.015 mm
Size	200 mm x 115 mm x 25 mm
Recommended air pressure range*④	-0.1 Mpa ~ +0.2 Mpa

Operating Environment

Operating voltage	24 V DC ±10%
Continuous current	(Linear) 1.2 A (Rotary) 0.8 A
Peak current	(Linear) 3.5 A
Recommended load	＜ 100 g
Recommended load inertia	20 g.cm²
Maintenance interval	Refer to Maintenance Instructions for DH-Robotics Linear coil actuator
IP rating	IP 40
Recommended operating environment	0~40℃, 85% RH以下
International standard compliance	CE, FCC, RoHS

Dimensions

DLE SERIES Direct Drive Linear Module
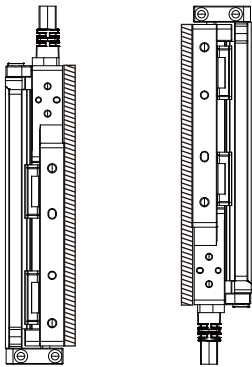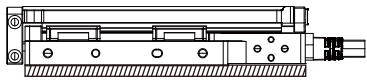
DLE-79-30
DLE-79-50

PRODUCT FEATURES

High Speed High Accuracy	High Energy Density High Stability and Reliability	Compact Design parameters adjustable
The direct drive technology guarantees higher speed and accuracy, that is, the maximum speed of 1.6 m/s, the maximum acceleration of 4 g, and positioning repeatability of ± 2 μm, to meet motion control needs in high-end manufacturing industries including precision assembly and testing.	Small size, light weight, large thrust, high speed, stable and reliable, and industry-leading performance.	Featuring compact structure and lighter weight, the product can be easily deployed in a confined space. Bus or pulse control allows for adjustment of force, position and stroke parameters and ease of installation.

INSTALLATION METHOD

Install it using the screw holes on the back of the product.

Installation Directions:

● Horizontal direction
● Vertical installation with the vertical rod pointing down
● Vertical installation with the vertical rod pointing up
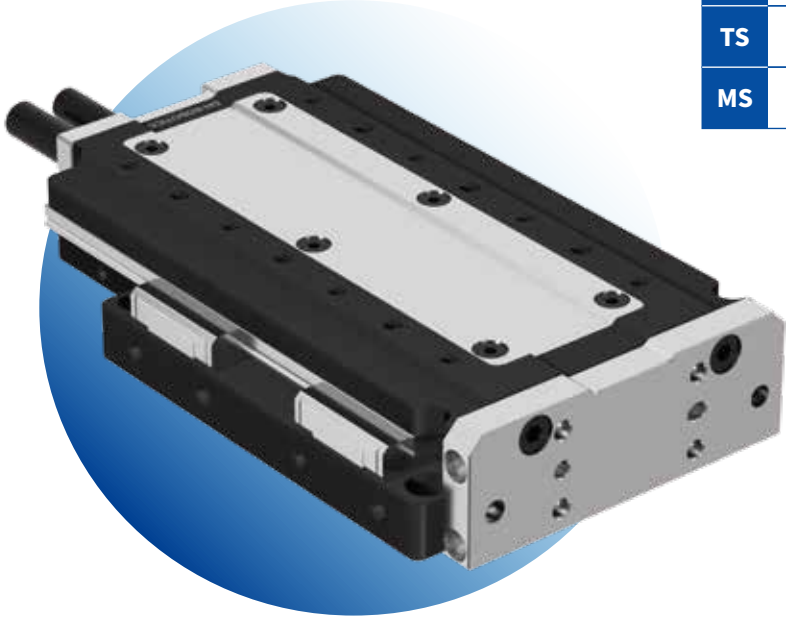
APPLICATION SCENARIOS

DLE features compact design and high energy density. The uniquely designed direct drive structure can be used in precision assembly of 3C products, force controlled pressing, and automatic transplanting.
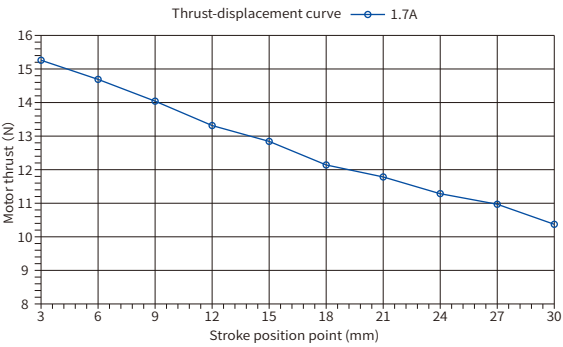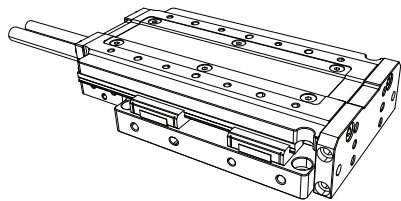
DLE-79-30

DIRECT DRIVE LINEAR MODULE

SELECTION METHOD

Voice Coil Series	Thickness (mm)	Stroke (mm)	Encoder	Voltage (V)	Spring configuration*	Customized*
DLE	79	30	H1	48	0	0

H1	Optical encoder, 0.5 μm
M2	Magnetic encoder, 1 μm

0	Without spring
TS	Mechanical spring
MS	Magnetic spring

0	No special customization
1	Special customization

*Note: For customization fees, consult the company's sales staff.

TECHNICAL SPECIFICATIONS

Intelligent Feedback

Adjustable Parameters

Long Life

Thrust-displacement curve — 1.7A

Motor thrust (N) vs Stroke position point (mm)

*① Motor output without protective spring;
*② This formula is used to calculate the output when a mechanical spring is configured. There is an error of ±0.5 N between the theoretical calculation formula and the actual condition.For other installation methods, please consult DH-Robotics engineers.
*③ It is the reference value under the recommended load. The actual force control accuracy is related to the load size, running tempo, etc.If you need a higher accuracy, please consult the DH-Robotics technical support;
*④ If the air pressure is beyond the specified range, you can consult DH-Robotics engineers.

Performance Specifications

|	
Peak thrust	54 N
Continuous thrust*①	18 N
Calculation formula for linear shaft motor output (vertically down)*②	$F=15.21-0.16*L$ (For the actual output, refer to the thrust-displacement curve)
Total stroke	30 mm
Maximum speed	1.2 m/s
Force control accuracy*③	2 N~20 N : ±0.5 N
Force constant	10.6 N/A
Linear encoder resolution	0.5 μm (Optical encoder) 1 μm(Magnetic encoder)
Linear positioning repeatability	±2 μm (Optical encoder) ±5 μm(Magnetic encoder)

Mechanical Specifications

Overall mass	790 g
Movable part mass	340 g
Size	130.5 mm x 79 mm x 26 mm
Recommended air pressure range*④	Without vacuum

Operating Environment

Operating voltage	48 V DC ±10%
Continuous current	(Linear) 1.7 A
Peak current	(Linear) 5.1 A
Recommended load	< 1000 g (for horizontal applications) < 500 g (for vertical applications)
Maintenance interval	Refer to Maintenance Instructions for DH-Robotics Linear coil actuator
IP rating	IP 40
Recommended operating environment	0~40°C, 85% RH以下
International standard compliance	CE, FCC, RoHS
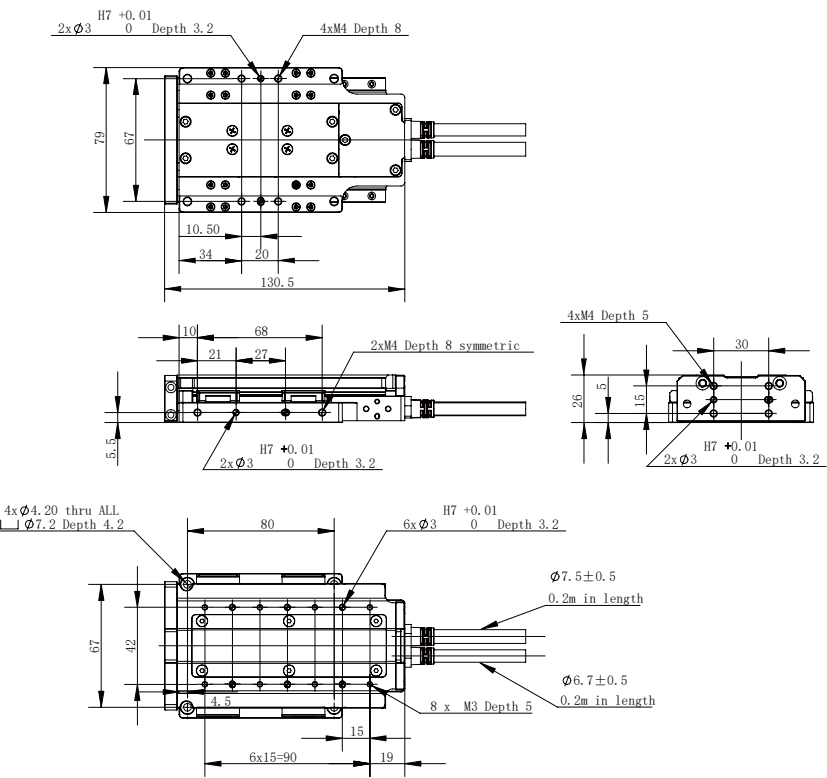
Dimensions

Schematic diagram of spring selection

Diagram of mechanical spring

Diagram of magnetic spring
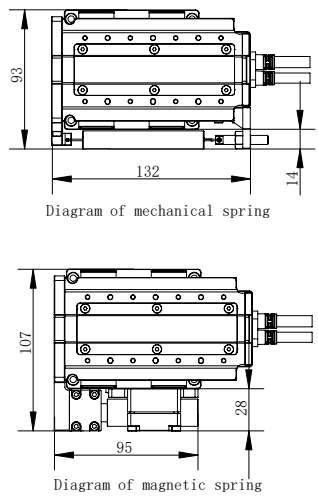
DLE-79-50

DIRECT DRIVE LINEAR MODULEZ

SELECTION METHOD

Voice Coil Series	Thickness (mm)	Stroke (mm)	Encoder	Voltage (V)	Spring configuration*	Customized*
DLE	79	50	H1	48	0	0

H1	Optical encoder, 0.5 μm
M2	Magnetic encoder, 1 μm

0	Without spring
TS	Mechanical spring
MS	Magnetic spring

0	No special customization
1	Special customization

*Note: For customization fees, consult the company's sales staff.

TECHNICAL SPECIFICATIONS

Intelligent Feedback Adjustable Parameters Long Life

Thrust-displacement curve — 1.7A

Motor thrust (N) vs Stroke position point(mm)

*① Motor output without protective spring;
*② This formula is used to calculate the output when a mechanical spring is configured. There is an error of ± 0.5 N between the theoretical calculation formula and the actual condition.For other installation methods, please consult DH-Robotics engineers.
*③ It is the reference value under the recommended load. The actual force control accuracy is related to the load size, running tempo, etc.If you need a higher accuracy, please consult the DH-Robotics technical support;
*④ If the air pressure is beyond the specified range, you can consult DH-Robotics engineers.

Performance Specifications

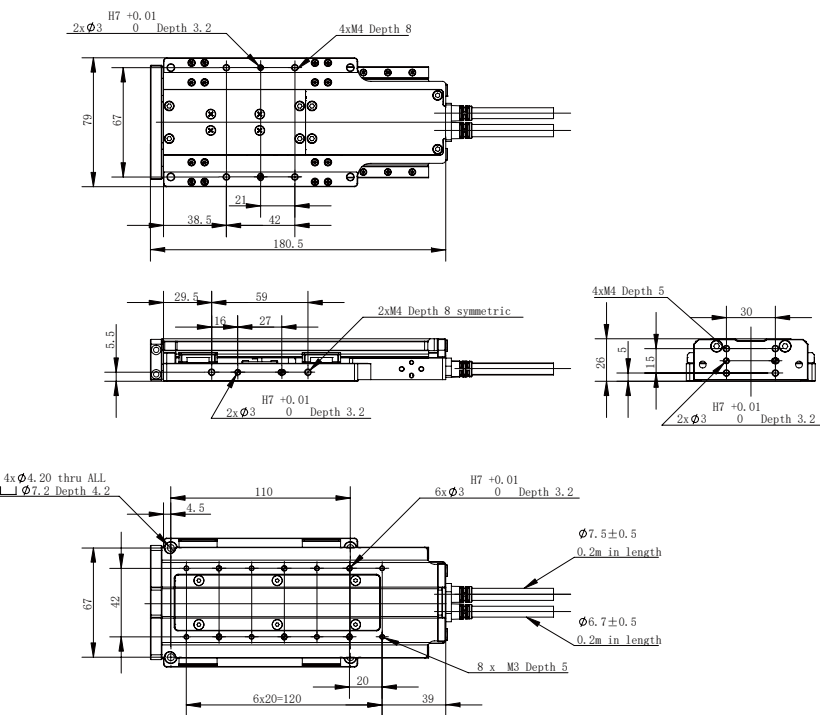|	
Peak thrust	54 N
Continuous thrust*①	18 N
Calculation formula for linear shaft motor output (vertically down)*②	$F=16.49-0.16*L$ (For the actual output, refer to the thrust-displacement curve)
Total stroke	50 mm
Maximum speed	1.6 m/s
Force control accuracy*③	2 N~20 N：±0.5 N
Force constant	10.6 N/A
Linear encoder resolution	0.5 μm (Optical encoder)　1 μm(Magnetic encoder)
Linear positioning repeatability	±2 μm (Optical encoder)　±5 μm(Magnetic encoder)

Mechanical Specifications

Overall mass	970 g
Movable part mass	470 g
Size	180.5 mm x 79 mm x 26 mm
Recommended air pressure range*④	Without vacuum

Operating Environment

Operating voltage	48 V DC ±10%
Continuous current	（Linear）1.7 A
Peak current	（Linear）5.1 A
Recommended load	＜ 900 g（for horizontal applications）＜ 400 g（for vertical applications）
Maintenance interval	Refer to Maintenance Instructions for DH-Robotics Linear coil actuator
IP rating	IP 40
Recommended operating environment	0~40°C, 85% RH or less
International standard compliance	CE, FCC, RoHS

Dimensions

Schematic diagram of spring selection

Diagram of mechanical spring

Diagram of magnetic spring
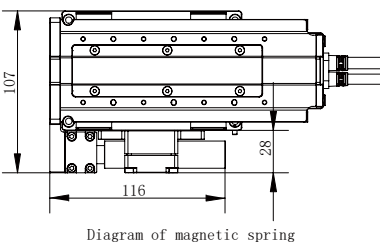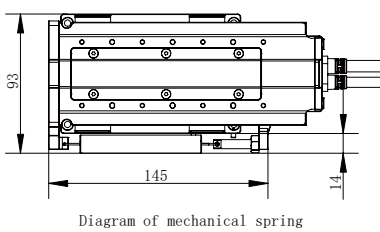
LINEAR COIL ACTUATOR DRIVE

The following table provides driver model options：

Drive	Communication Method	Operating Mode	I/O	Note	Model
SAC-N2 (DH-ROBOTICS)	USB	Velocity mode Torque mode Position mode	5 DI on each axis	Integrated dual-axis control Compact design Excellent force control accuracy Force control Force control Built-in soft landing Built-in electronic gear ratio	EtherCAT： SAC-N2-EC-U-03-A1-03-A1
	EtherCAT	Position track mode Velocity track mode Torque track mode Cyclic Synchronous Position mode Cyclic Synchronous Velocity mode Cyclic Synchronous Torque mode	2 DO on each axis 1 AI on each axis 1 single-ended pulse input 1 single-ended direction input		
	Pulse control	Pulse + direction mode CW/CCW mode Ortho mode			
Two-axis stepper motor driver	USB	Position Trajectory Mode Velocity Trajectory Mode	4 Digital Inputs Per Axis / 2 Digital Outputs Per Axis	Dual-Axis Integration, Stepper Drive, Compact Size, Easy Operation, Convenient Installation, High Cost-Effectiveness	MS-MINI3E-2D
	EtherCAT	Position Trajectory Mode Velocity Trajectory Mode Cyclic Synchronous Position Mode			

Note: If you need to select a third-party driver, please consult DH Robotics' sales representatives.

DRIVER & ACTUATOR CABLE MATCHING TABLE

Actuator Model (First 3 Digits)	Driver Model	Control Cable Length(m)	Control Cable Part Number	Actuator : driver : cable quantity ratio	Note
VLA-10-20	1-S503-0003-X5LX (SAC-N2 dual-axis low voltage bus drive)	3	X775-0644-D1	2:1:2	
		5	X775-0645-D1		
		7	X775-0646-D1		
		10	X775-0647-D1		
VLA-16-15 VLA-25-10 VLA-25-25 VLA-30-25		1	X775-0218-D1	2:1:2	
		3	X775-0219-D1		
		5	X775-0220-D1		
		7	X775-0221-D1		
		10	X775-0222-D1		
DLE-79-30 DLE-79-50		1	X775-0559-D1+X775-0296-D1	2:1:2	
		3	X775-0267-D1+X775-0297-D1		
		5	X775-0274-D1+X775-0298-D1		
		7	X775-0275-D1+X775-0299-D1		
		10	X775-0276-D1+X775-0300-D1		
VLAR-20-15/VLAR-20-25 VLAR-25-25/VLAR-25-40 DLAR-16-25/DLAR-16-40 DLAR-20-40/DLAR-25-50		1	X775-0144-D1	1:1:1	
		3	X775-0145-D1		
		5	X775-0146-D1		
		7	X775-0147-D1		
		10	X775-0148-D1		
DLAR-35-50		1	X775-0462-D1	1:1:1	
		3	X775-0637-D1		
		5	X775-0463-D1		
		7	X775-0638-D1		
		10	X775-0639-D1		
DLSR-25-50	1-S506-0013-Z100 (SAC-N2 dual-axis low-voltage bus driver + stepper low-voltage bus dual-axis driver)	1	X775-0181-D1	2:1:2	2 DLSR motors with 1 set of drive components and 2 sets of control cables
		3	X775-0182-D1		
		5	X775-0183-D1		
		7	X775-0184-D1		
		10	X775-0185-D1		

Note: Please consult DH-ROBOTICS sales personnel for matching third-party drive cables.

CUSTOMER TRUST

More than 800 customers around the world are using DH-Robotics products
The number of customers continues to grow rapidly. . .

FAW-VOLKSWAGEN 一汽-大众	SAMSUNG	TOYOTA	LENS 蓝思科技	周大福 CHOW TAI FOOK
FOXCONN	Lyric Robot	BOSCH	HUAWEI	LUXSHARE ICT
BYD	DJI 大疆创新	molex	mindray 迈瑞	GREE 格力
SAIC VOLKSWAGEN 上汽大众	京东方 BOE	KFC	Lenovo	FANUC
中国航天	HELLA	COMAU	SanDisk	JABIL GREEN POINT

PRODUCT DISTRIBUTION

Chinese Agent Distribution Cties

Beijing/Changchun/Changsha/Chengdu/Chongqing/Dalian/Dongguan/
Guangzhou/Hangzhou/Hefei/Jinan/Nanchang/Nanjing/Ningbo/Qingdao/
Shanghai/Shenyang/Shenzhen/Suzhou/Wuhan/Wuxi/Xi'an/Xiamen/Yantai/
Yangzhou/Zhengzhou/Zhuhai

Overseas Agents Distribution Area

Europe: Spain / France / Italy / Germany / UK / Czech Republic / Romania / Russia /
Netherlands / Lithuania / Sweden / Denmark / Norway
Asia: Israel / Bangladesh / India / Japan / Thailand / South Korea / Malaysia
Australia: Australia / New Zealand
America: United States / Mexico
Middle East: Saudi Arabia / Tunisia / Türkiye

DH-ROBOTICS

A professional provider of precision motion control products and solutions