DH-ROBOTICS

LINEAR COIL ACTUATOR

DH-Robotics Technology Co.,Ltd.

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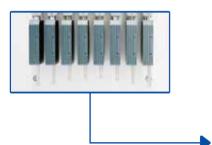
FEATURES AND APPLICATIONS

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.
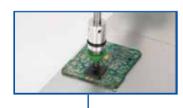
PRODUCT FEATURES

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

3 Working Modes

- Velocity mode
- Torque mode
- Position mode

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°

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 technolo gy reduces the scratch rate and fragmentation rate of preci sion 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:

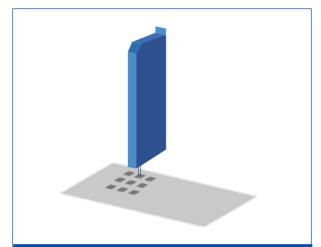**Integrated Design Small Volume Saving Device Space**
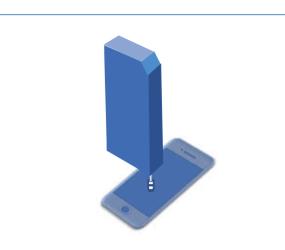
Higher Accuracy Faster More Stable Motion

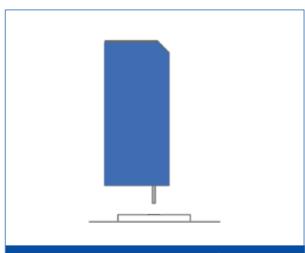**Precision Component Less Wear Longer Service Life**

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.
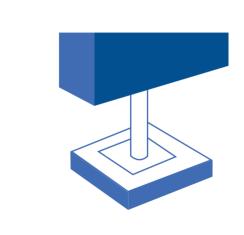
Electronics Testing

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 performing 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.
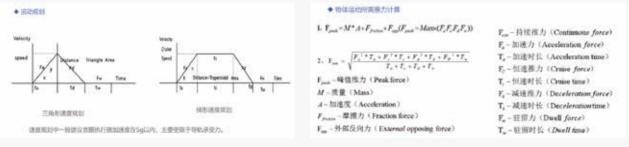
Q：What is soft landing?

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 ± 3 g, and the closed-loop force control accuracy is within ±1 g.The force control accuracy is mainly related to actuator type, load size, running tempo, and controller performance.Generally 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-Robotics 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.
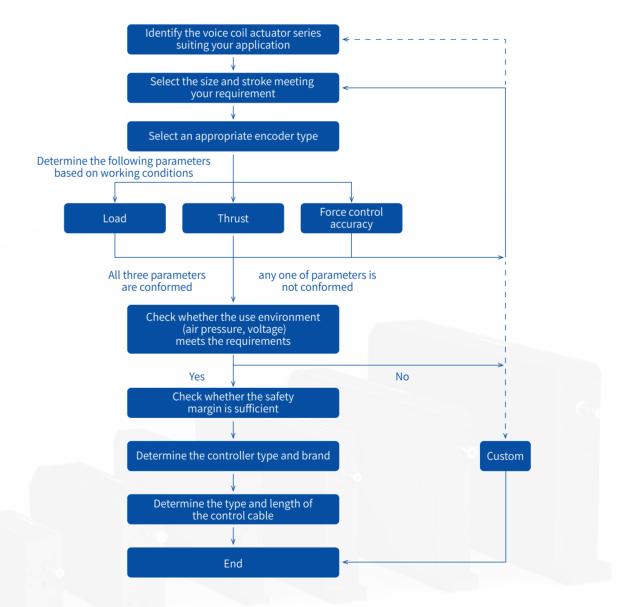
Q：How much radial force can the vertical rod of the actuator withstand?

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 cable?What are the wiring requirements?

A：The control cable is approximately 8 mm in diameter.For wiring requirements, refer to Cable Installation Requirements of Voice Coil Actuators of DH-Robotics.

SELECTION PROCEDURE

VLA SERIES
Linear Coil Actuator

VLA-10-20 (Vacuum)
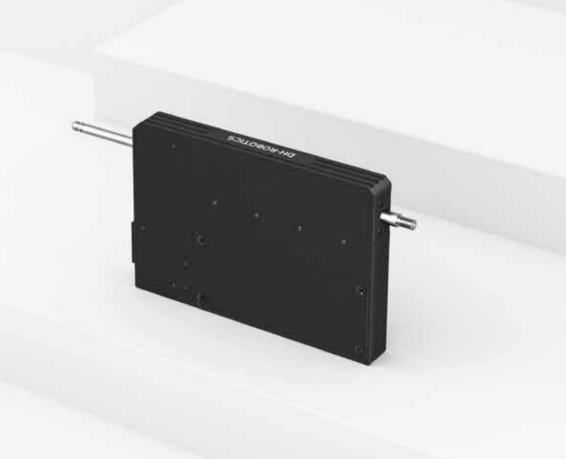
VLA-16-15

VLA-16-15 (Vacuum)

VLA-25-10 (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.
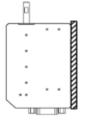
INSTALLATION METHOD

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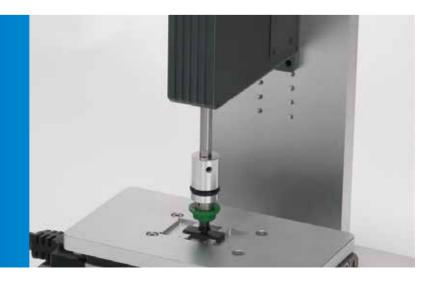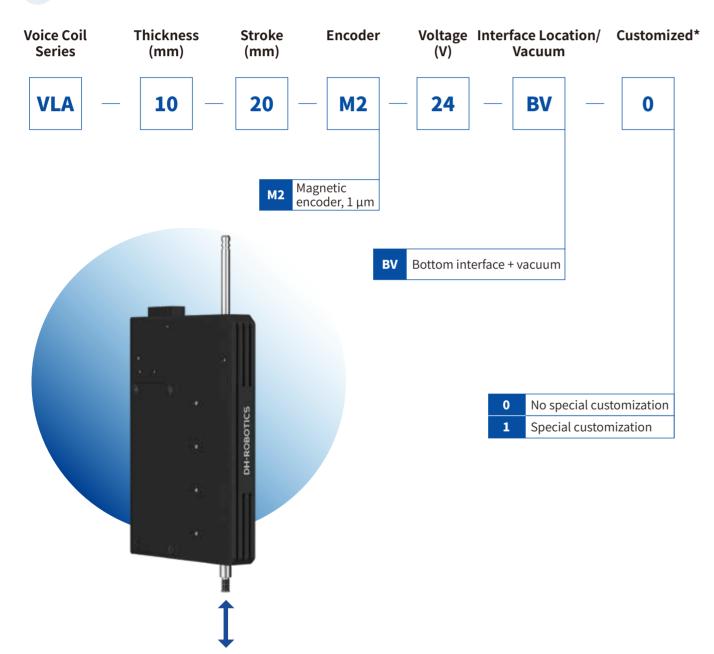
The force repeatability of ±5 g, micron-level resolution, and ultra-high motion frequency of the VLA series help to improve the efficiency and yield rate of quick pick-and-place, assembly, testing, and other scenarios in semiconductor, 3C electronics, optoelectronics, and other industries.

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) / Stroke position point (mm)

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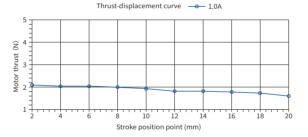
Peak thrust	4 N
Continuous thrust*①	1.8 N
Calculation formula for linear shaft motor output (vertically down)*②	F=2.15-0.027*L (For the actual output, refer to the thrust-displacement curve)
Total stroke	20 mm
Force control accuracy*③	30 g ~100 g : ±5 g
Force constant	1.8 N/A
Linear encoder resolution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

Mechanical Specifications

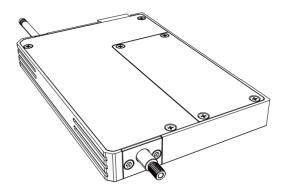| Overall mass	130 g
Movable part mass	30 g
Size	85 mm x 58 mm x 10 mm
Recommended air pressure range*④	-0.1 Mpa ~ +0.2 Mpa

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℃, 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
Ø3
H7 +0.01 0 Depth 1.5
2xØ2
80
69
0.50

6
Ø1.50 thru ALL
47 ±0.10
10
27 Rod Fully Ext
58
2.60
85
5 Rod Fully Ret
M3 Male Screw
5
Ø4 h6 -0.01 0
Ø4 Insertion Of The Windpipe
PHD-2X06P
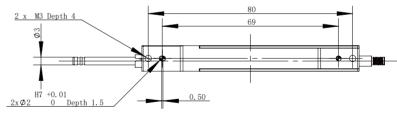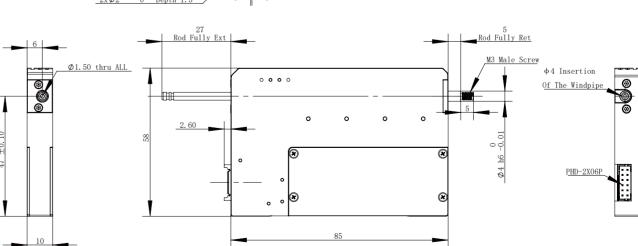
VLA-16-15

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

Thrust-displacement curve — 1.0A

Performance Specifications
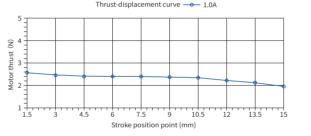
Peak thrust	6 N
Continuous thrust*①	3 N
Calculation formula for linear shaft motor output (vertically down)*②	F=2.60-0.032*L (For the actual output, refer to the thrust-displacement curve)
Total stroke	15 mm
Force control accuracy*③	30 g ~ 200 g: ±5 g
Force constant	3 N/A
Linear encoder resolution	1 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.

Dimensions

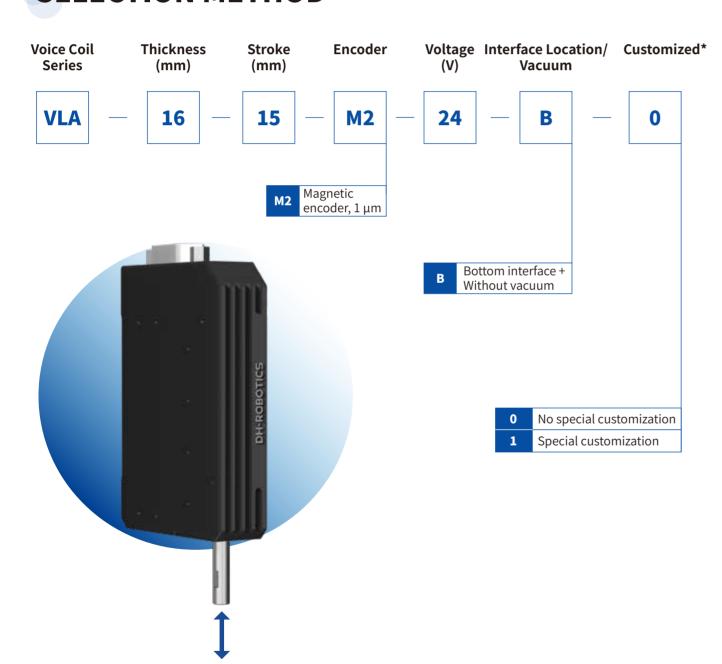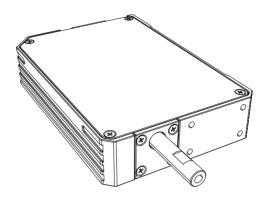# VLA-16-15 (Vacuum)

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

Thrust-displacement curve — 1.0A

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

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
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	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 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;
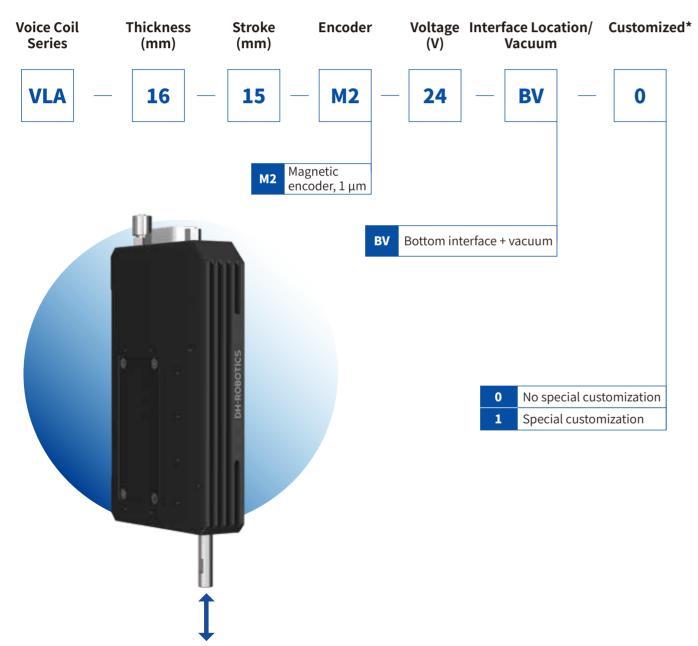*④ If the air pressure is beyond the specified range, you can consult DH-Robotics engineers.
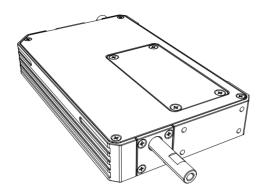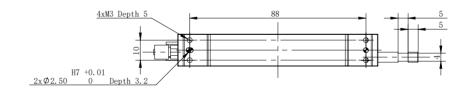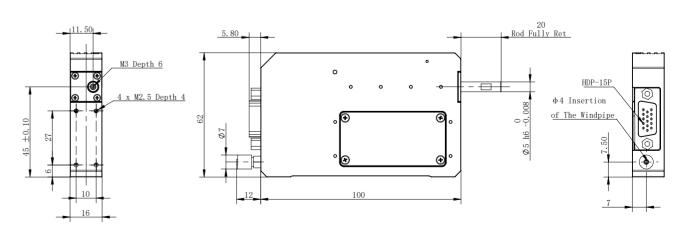
Dimensions

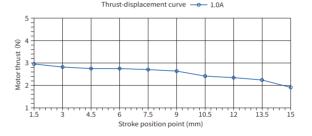# VLA-25-10 (Vacuum)

LINEAR COIL ACTUATOR

SELECTION METHOD

Voice Coil Series	Thickness (mm)	Stroke (mm)	Encoder	Voltage (V)	Interface Location/ Vacuum	Customized*
VLA	25	10	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.

Intelligent Feedback

Adjustable Parameters

Long Life

Performance Specifications

Peak thrust	12 N
Continuous thrust*①	4.8 N
Calculation formula for linear shaft motor output (vertically down)*②	F=4.67-0.08*L (For the actual output, refer to the thrust-displacement curve)
Total stroke	10 mm
Force control accuracy*③	30 g ~ 100 g: ±5 g 100 g ~ 400 g: ±5%
Force constant	6.8 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	310 g
Movable part mass	57 g
Size	80 mm x 60 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	0.7 A
Peak current	1.8 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.
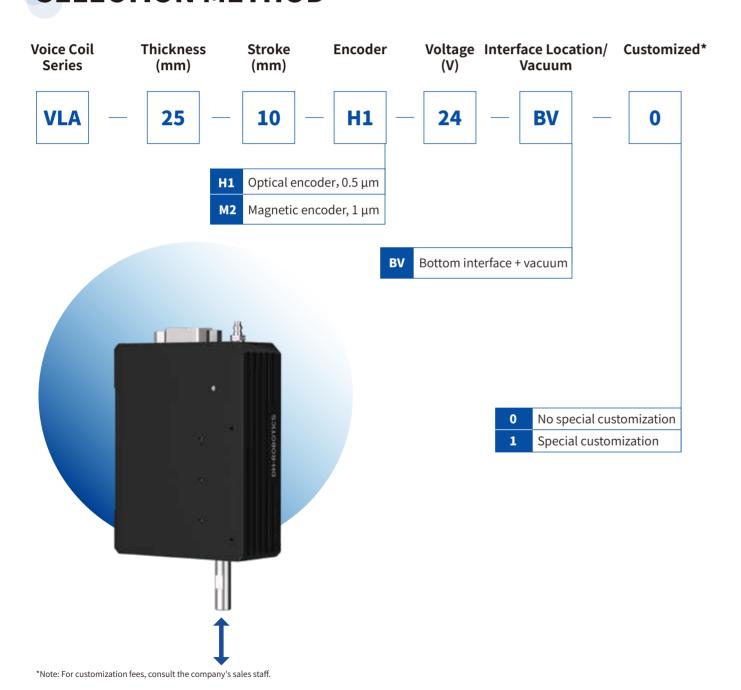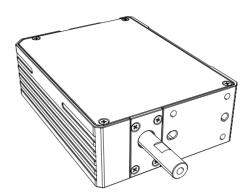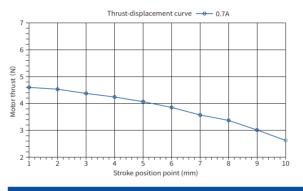
Thrust-displacement curve — 0.7A

Motor thrust (N)

Stroke position point (mm)

Dimensions

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**
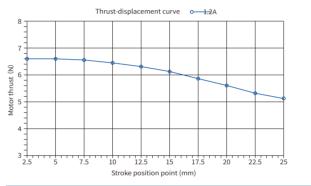
Performance Specifications

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
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

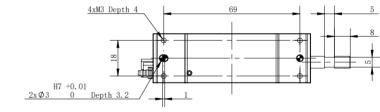|	
Operating voltage	24 V DC ±10%
Continuous current	1.2 A
Peak current	2.2 A
Recommended load	< 150 g
Maintenance interval	Refer to Maintenance Instructions for DH-Robotics Linear coil actuator
IP rating	IP 40
Recommended operating environment	0~40℃, 85% RH or less
International standard compliance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

*① Motor output without protective spring;
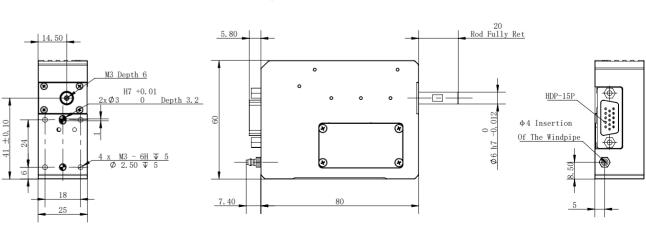*② There is an error of ± 0.3 N between the theoretical calculation formula and the actual condition. For the output calculation of other installation methods, please consult DH-Robotics engineers;
*③ It is the reference value under the recommended load. The actual force control accuracy is related to 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.

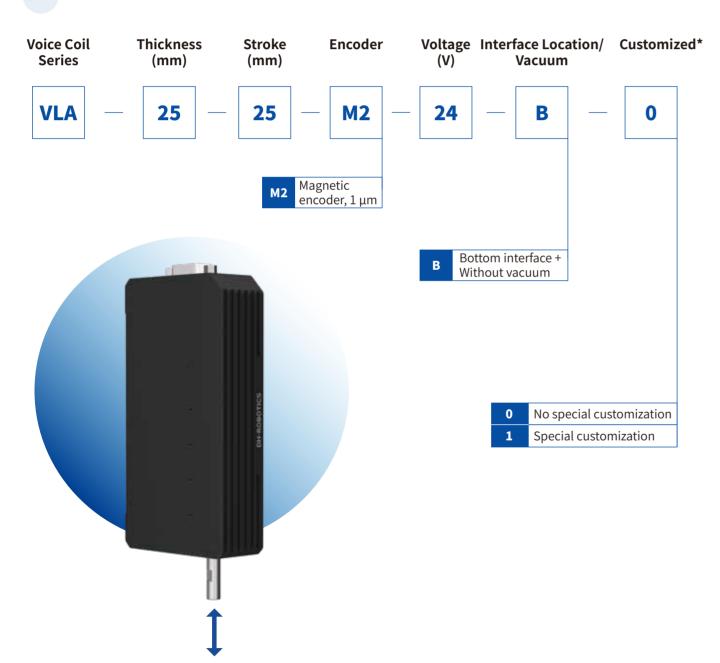Thrust-displacement curve —o— 1.2A
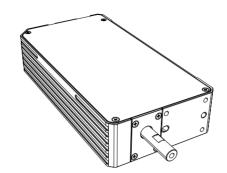
(Motor thrust (N) vs Stroke position point (mm))

Dimensions

4xM3 Depth 4 108 5 8 5
18
2xφ3 H7 +0.01 / 0 Depth 3.2

14.50
M3 Depth 6
2xφ3 H7 +0.01 / 0 Depth 3.2
42 ±0.10 24 7
4xM3 Depth 6
18
25

5.80 62 120

20 Rod Fully Ret
φ6 h6 -0.008 / 0
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

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	25mm	
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

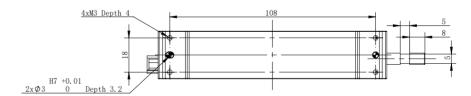|		
Operating voltage	24 V DC ±10 %	
Continuous current	1.5 A (24 V)	2.0 A (48 V)
Peak current	3.0 A (24 V)	4.0 A (48 V)
Recommended load	< 250 g	
Maintenance interval	Refer to Maintenance Instructions for DH-Robotics Linear coil actuator	
IP rating	IP 40	
Recommended operating environment	0~40℃, 85%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

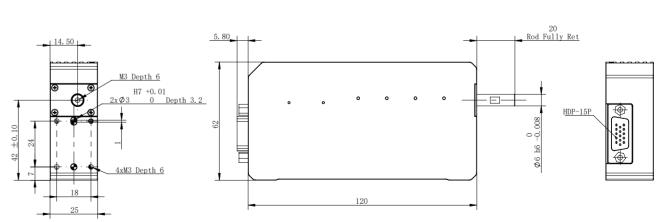*① Motor output without protective spring;
*② There is an error of ± 0.3 N between the theoretical calculation formula and the actual condition. For the output calculation of other installation methods, please consult DH-Robotics engineers;
*③ It is the reference value under the recommended load. The 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

VLAR-25-40

PRODUCT FEATURES

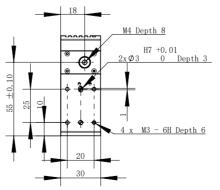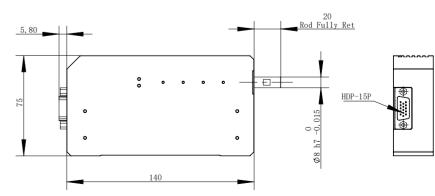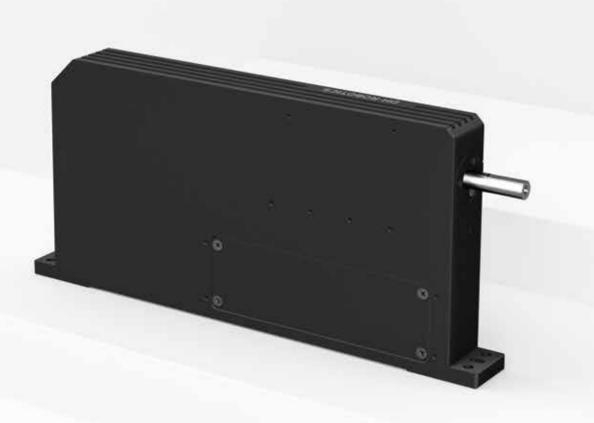| High Performance Linear/Rotary Motion Adjustable Parameters	Hollow Rod Soft Landing Power-off Protection	Precision Resolution Long Life over 100 Million Cycles
Provide accurate linear and rotary actions of the Z-axis during high-speed motion, with adjustable velocity, thrust, and position parameters, 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 repeatabil ity 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;
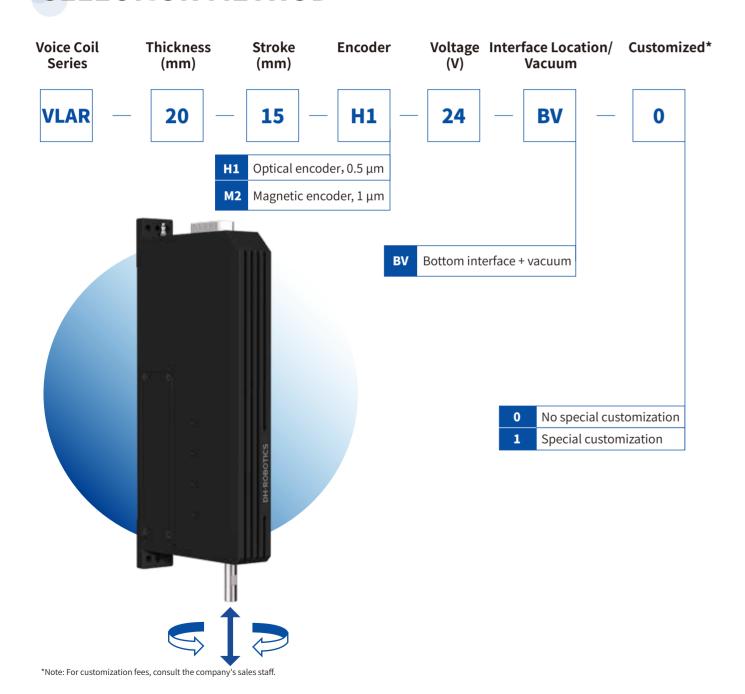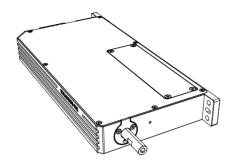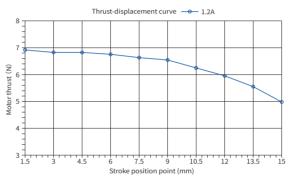*④ If the air pressure is beyond the specified range, you can consult DH-Robotics engineers.

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
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
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

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	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
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	197g
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

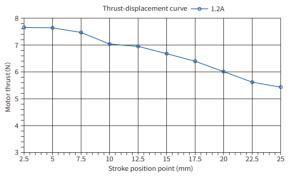## Dimensions

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

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
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
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

Thrust-displacement curve ── 1.2A

*① Motor output without protective spring;
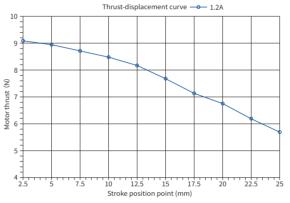*② There is an error of ±0.3 N between the theoretical calculation formula and the actual condition. For the output calculation of other installation methods, please consult DH-Robotics engineers;
*③ It is the reference value under the recommended load. The actual force control accuracy is related to 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

VLAR-25-40

LINEAR ROTARY COIL ACTUATOR

SELECTION METHOD

Voice Coil Series	Thickness (mm)	Stroke (mm)	Encoder	Voltage (V)	Interface Location/ Vacuum	Customized*
VLAR	25	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	10 N
Continuous thrust*①	5.5 N
Calculation formula for linear shaft motor output (vertically down)*②	F=4.16-0.065*L (For the actual output, refer to the thrust-displacement curve)
Total stroke	40 mm
Force control accuracy*③	50 g ~ 200 g：±10 g / 200 g ~ 400 g：±5%
Force constant	4.6 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	1130 g
Movable part mass	220 g
Size	195 mm x 106 mm x 20 mm
Recommended air pressure range*④	-0.1 Mpa ~ +0.2 Mpa

Operating Environment

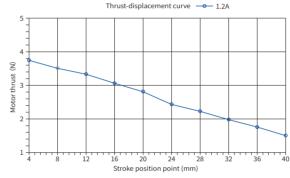|	
Operating voltage	24 V DC ±10%
Continuous current	（Linear）1.2 A　（Rotary）1.0 A
Peak current	（Linear）2.2 A　（Rotary）2.8 A
Recommended load	＜ 100 g
Recommended load inertia	10 g.cm²
Maintenance interval	Refer to Maintenance Instructions for DH-Robotics Linear coil actuator
IP rating	IP 40
Recommended operating environment	0~40°C, 85% RH or less
International standard compliance	CE, FCC, RoHS
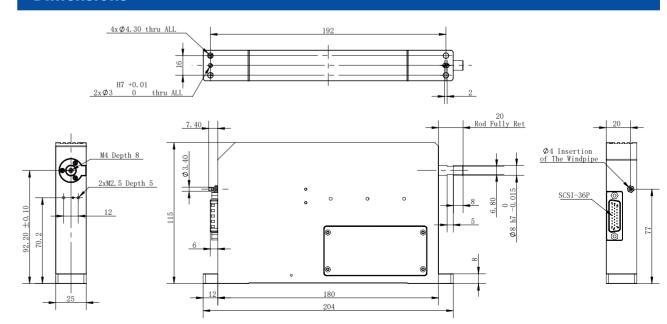
Dimensions

DLAR SERIES
Direct Drive Linear
Rotary Actuator

DLAR-16-25

DLAR-16-40

DLAR-20-40

DLAR-25-50

DLAR-35-50

PRODUCT FEATURES

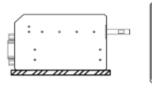| High Performance Linear/Rotary Motion Adjustable Parameters	Hollow Rod Soft Landing Power-off Protection	Precision Resolution Long Life over 100 Million Cycles
Provide accurate linear and rotary actions of the Z-axis during high-speed motion, with adjustable velocity, thrust, and position parameters, 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

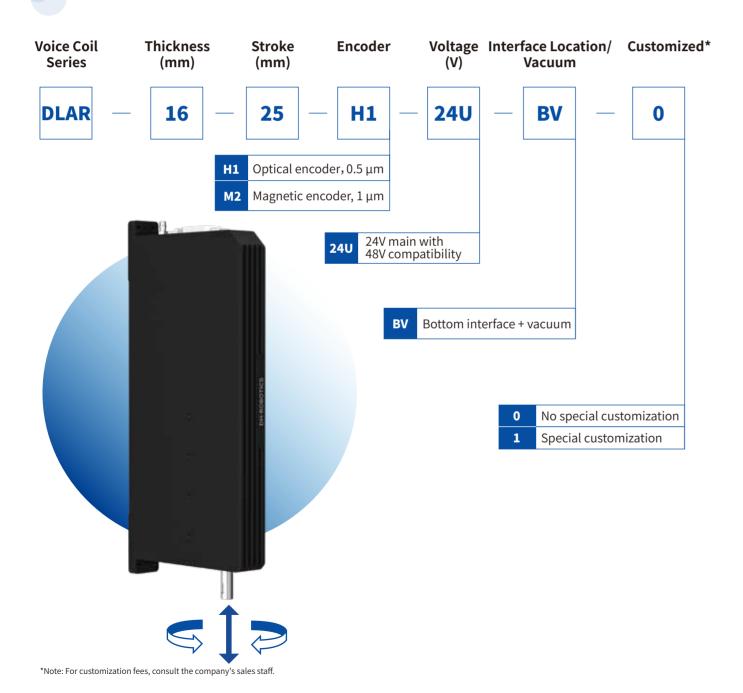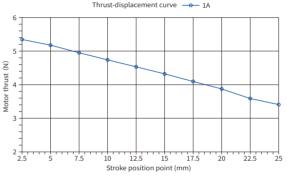| 0	No special customization
1	Special customization

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

TECHNICAL SPECIFICATIONS

Intelligent Feedback   Adjustable Parameters   Long Life

Thrust-displacement curve —●— 1A

*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=5.68-0.089*L (For the actual output, refer to the thrust-displacement curve)
Total stroke	25 mm
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
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) 1.2 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

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

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
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
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

Thrust-displacement curve — 1.0A

Motor thrust (N) vs Stroke position point (mm)
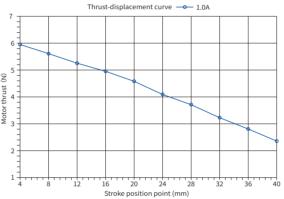
*① Motor output without protective spring;
*② There is an error of ± 0.3 N between the theoretical calculation formula and the actual condition. For the output calculation of other installation methods, please consult DH-Robotics engineers;
*③ It is the reference value under the recommended load. The 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.

Dimensions

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
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
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

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
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
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
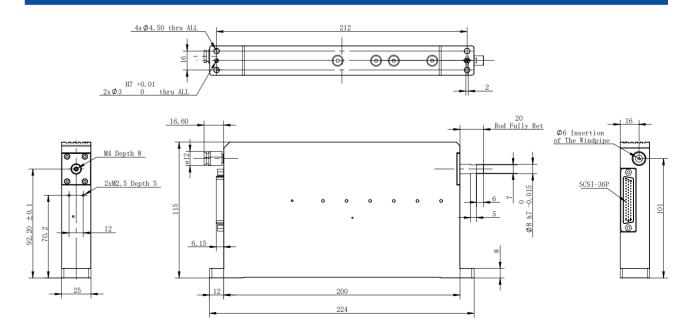
Thrust-displacement curve — 1.2A

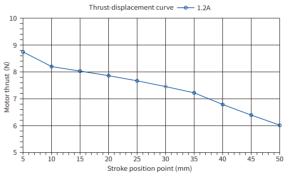(Chart: Motor thrust (N) vs Stroke position point (mm))

*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.
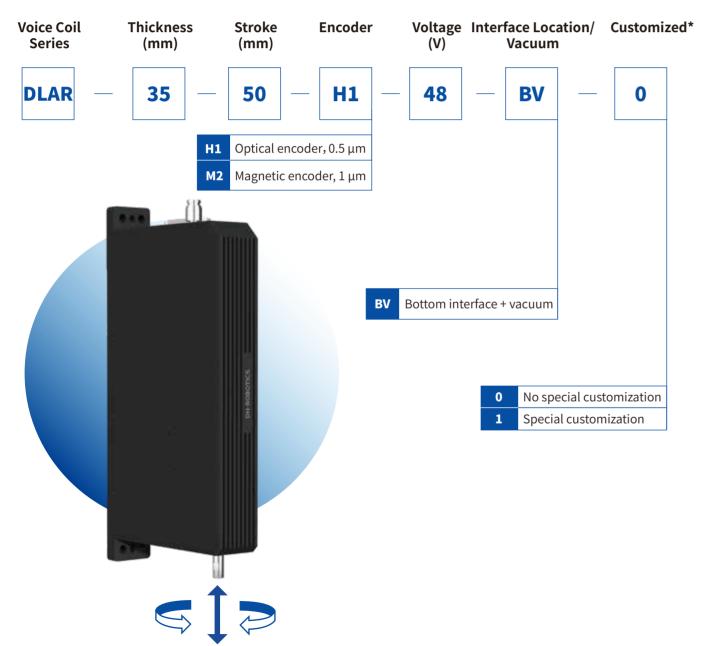
Dimensions

DLAR-35-50

DIRECT DRIVE LINEAR ROTARY ACTUATOR
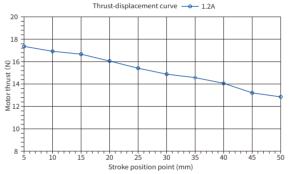
SELECTION METHOD

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
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
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℃, 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

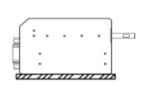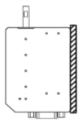| High Performance Linear/Rotary Motion Adjustable Parameters	Hollow Rod Soft Landing Power-off Protection	Precision Resolution Long Life over 100 Million Cycles
Provide accurate linear and rotary actions of the Z-axis during high-speed motion, with adjustable velocity, thrust, and position parameters, 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
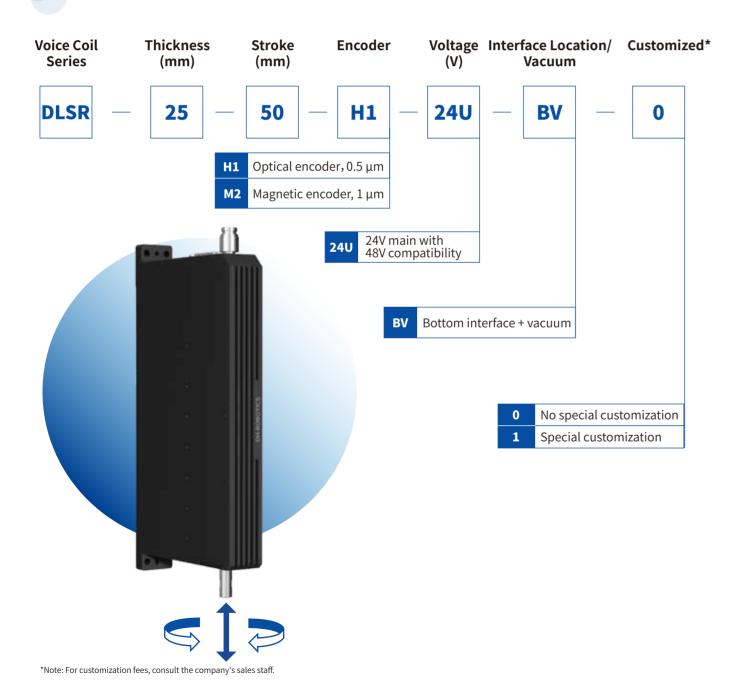- Vertical installation with the vertical rod pointing up

APPLICATION SCENARIOS

DLSR features linear and rotary motion plus ± 5 N force repeatability, and can be applied in assembly and bonding of 3C products, automatic transplanting, handling, etc.
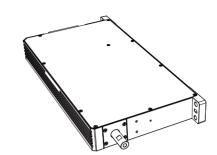
DLSR-25-50

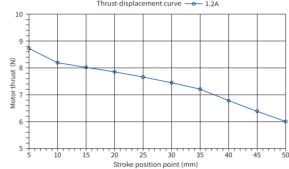## DIRECT DRIVE LINEAR ROTARY ACTUATOR

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
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
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
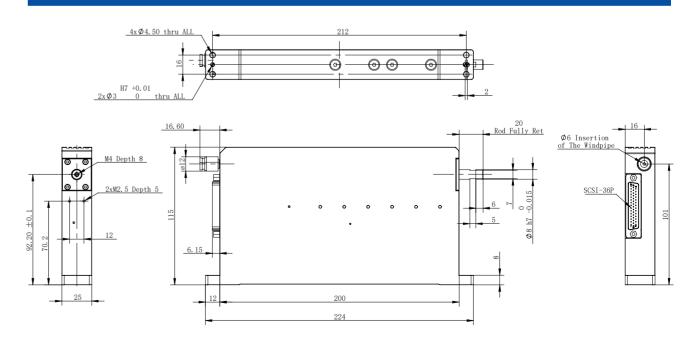
Dimensions

DLE SERIES
Direct Drive Linear Module

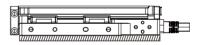DLE-79-30
DLE-79-50

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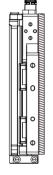
INSTALLATION METHOD
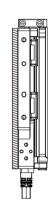
Install it using the screw holes on the back of the product.

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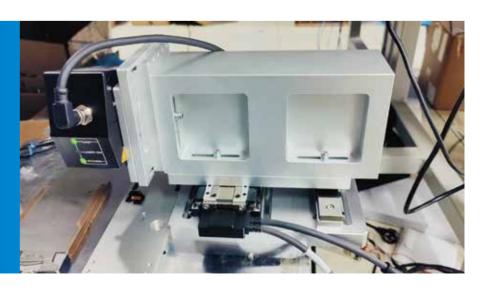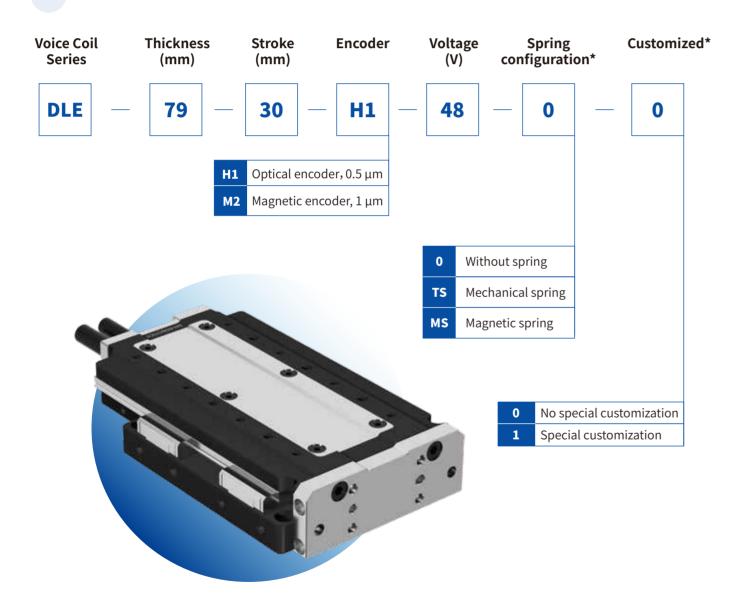
APPLICATION SCENARIOS

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

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
Force control accuracy*③	2 N~15 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	690 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

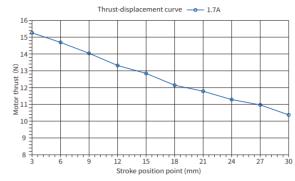|	
Operating voltage	48 V DC ±10%
Continuous current	(Linear) 1.7 A
Peak current	(Linear) 5.1 A
Recommended load	< 1000 g (for horizontal applications) < 500 g (for vertical applications)
Maintenance interval	Refer to Maintenance Instructions for DH-Robotics Linear coil actuator
IP rating	IP 40
Recommended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

*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.

Dimensions

Schematic diagram of spring selection

Diagram of mechanical spring

Diagram of mechanical spring
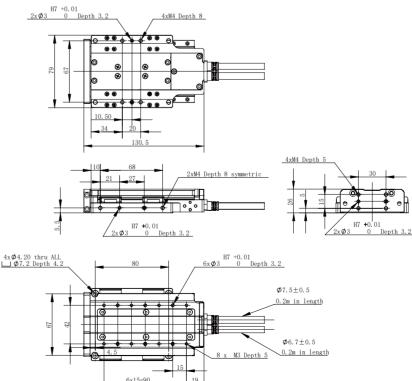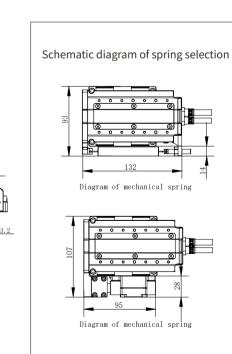
DLE-79-50

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

*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
Force control accuracy*③	2 N~15 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 2 DO on each axis 1 AI on each axis 1 single-ended pulse input 1 single-ended direction input	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			
	Pulse control	Pulse + direction mode CW/CC2 mode Ortho mode			
ISD (DH-ROBOTICS)	USB	Velocity mode Torque mode Position mode	6 digital inputs 4 digital outputs 2 12-bit analog inputs	Small size with excellent force control accuracy. The built-in soft landing function can be configured with rich parameters and is flexible for use.	EtherCAT: ISD-N-EC-U-10A1
	EtherCAT (CoE) (changeable to CANopen)	Position track mode Velocity track mode Torque track mode Interpolated position mode Cyclic Synchronous Position mode Cyclic Synchronous Velocity mode Cyclic Synchronous Torque mode			
SERVO TRONIX	USB	Velocity mode Torque mode Position mode	8 digital inputs 3 fast digital inputs 6 digital outputs 2 fast digital outputs 1 16-bit analog input 2 14-bit analog inputs 1 analog output	Medium size, good force control accuracy, no soft landing function, and configurable I/O trigger script	EtherCAT: CDHD2-0031 DEC2
	RS232				
	Analog voltage	Analog velocity mode Analog torque mode			
	EtherCAT (CoE) (changeable to CANopen)	Position track mode Velocity track mode Torque track mode Interpolated position mode Cyclic Synchronous Position mode Cyclic Synchronous Velocity mode Cyclic Synchronous Torque mode			

Drive	Communication method	Operating mode	I/O	Note	Model
ELMO	USB	Velocity mode Torque mode Position mode	6 digital inputs 2 digital outputs 1 analog input	Small size, excellent force control accuracy, built-in soft landing function, and programmable inside the drive	EtherCAT: G-MOL-WHI5/100EE
	RS232				
	EtherNET UDP				
	EtherCAT (CoE) (changeable to CANopen)	Position track mode Velocity track mode Torque track mode Interpolated position mode Cyclic Synchronous Position mode Cyclic Synchronous Velocity mode Cyclic Synchronous Torque mode			

Customer trust

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

DH-ROBOTICS

A professional provider of precision motion control products and solutions

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