Akribis
where precision matters

Voice Coil Motor User Manual

Important Information

This instruction manual contains general procedures that applies to voice coil motor components and table. Before installing and using the voice coil, read this instruction manual carefully. It provides the information required for installation, configuration and basic operation of the voice coil moto. The manufacturer declines all responsibility for damage caused by improper use and installation of the voice coil motor.

This manual is not intended to include a comprehensive listing for all procedures required for installation, operation and maintenance. It only describes general guidelines that apply to the voice coil motor. It is intended for persons who are qualified to transport, assemble, commission, and maintain the equipment described herein.

For further enquiries, please do not hesitate to contact Akribis for more clarification.

Revision Notes

Document Revision	Date	Remarks
00	April 2018	General Release
1.0	Dec 2020	AVM75 cable size

Customer Service

Akribis is committed to delivering quality customer service and support for all our products. Our goal is to provide our customers with the information and resources so that they are available, without delay, if and when they are needed. In order to serve in the most effective way, we recommend that you contact your local sales representative for order status and delivery information, product information and literature, and application and field technical assistance. If you are unable to contact your local sales representative for any reason, please use the most relevant of the contact details below:
sales@akribis-sys.de

Contact Information

Akribis will not share any responsibility for damage caused by Customer attempt to repair or conduct any modifications. For further assistance, please contact the offices that is nearest to your location.

Technical support

If you need assistance with the installation of voice coil motor, contact Akribis Technical Support through the following email or via the Telephone list.
support@akribis-sys.de

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Warranty

The warranty is valid for ***12 months*** from the date of shipment and applies only if material or workmanship is found to be defective. The warranty will be ***Invalid*** if the customer attempt to repair or fails to install, operate, and maintain the product in accordance with the instructions in this user manual.

During the warranty period, the owner must pay the cost of shipping the product to the factory for repair, and Akribis will pay for shipping the repaired product to the customer. After the warranty period has expired, all shipping costs will be the responsibility of the customer.

Before returning the product, the customer must first request a Return Materials Authorization (RMA) number from Akribis by email to: support@akribis-sys.de

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Chapter 1 - Introduction

1.1 About These Assembly Instructions

These assembly instructions describe the motor and explain how to assemble the motor from the delivery up to disposal.
Before you start to assemble the motor, you must read these assembly instructions to ensure safe, Problem-free operation and to maximize the service life.
Akribis continually strives to improve the quality of information provided in these operating instructions. If you find any mistakes or would like to offer suggestions how this document could be improved, please contact the Akribis Service.

1.2 Voice coil motor components and table

1.2.1 AVM Series

- Direct drive, component
- Zero cogging
- Low coil mass with very fast response and bandwidth

1.2.2 AVA Series

- Direct drive, flat form, component
- Zero cogging
- Low coil mass with very fast response and bandwidth

1.2.3 MGV Series

- Direct drive, voice coil motor module
- Zero cogging
- Miniature linear guidance rails
- Low velocity ripple

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1.2.4 XRV Series

- Direct drive, voice coil motor module
- Zero cogging
- Fast response and settling
- Low friction
- High precision

1.2.5 DGV Series

- Direct drive, voice coil motor module
- Zero cogging
- Miniature linear guidance rails
- Low moving mass

1.2.6 TGV Series

- Direct drive, voice coil motor module
- Zero cogging
- Fast response and settling
- Low friction
- High precision
- Big thru hole

1.2.7 AZT Series

- Direct drive, voice coil motor module
- Zero cogging
- Fast response and settling
- Compact

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1.3 Design of the voice coil motor

A voice coil motor is an electric motor and consists of two components, coil and track. The coil carrying alternating current to generate a force in magnetic field. Track consists of permanent magnets and provide a steady magnetic field.
A voice coil module consists of voice coil motor, position feedback and linear guide.

1.3.1 AVM Design

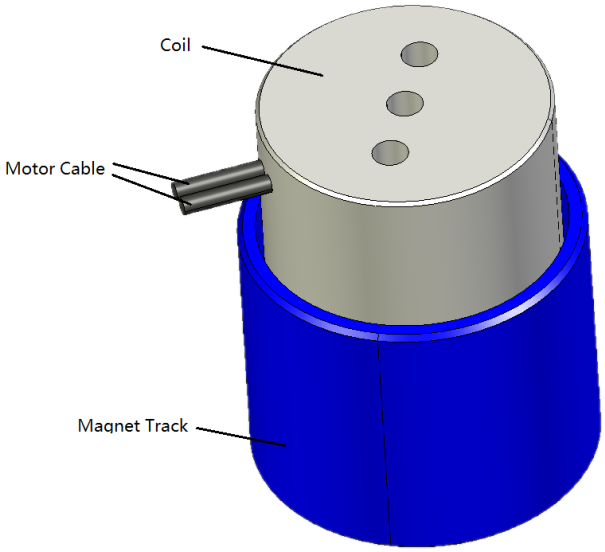

Fig. 1 AVM design

1.3.2 AVA Design

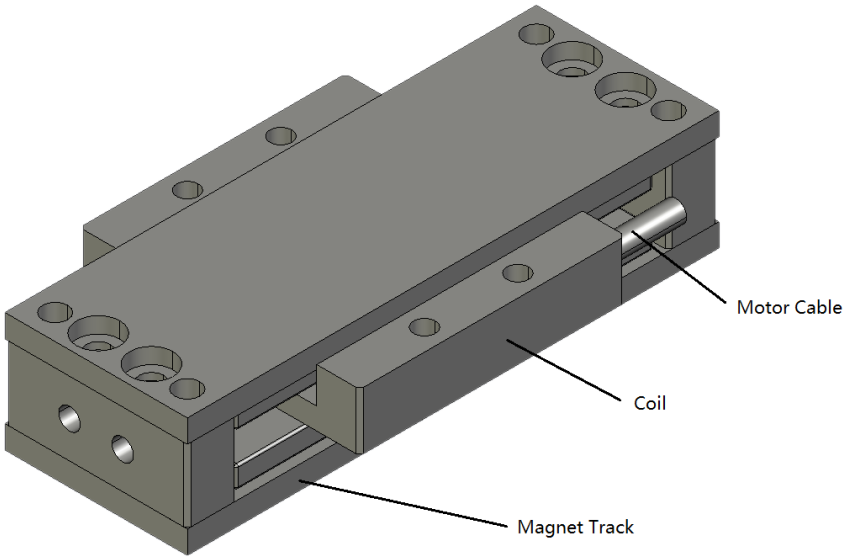

Fig. 2 AVA design

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1.3.3 MGV Design

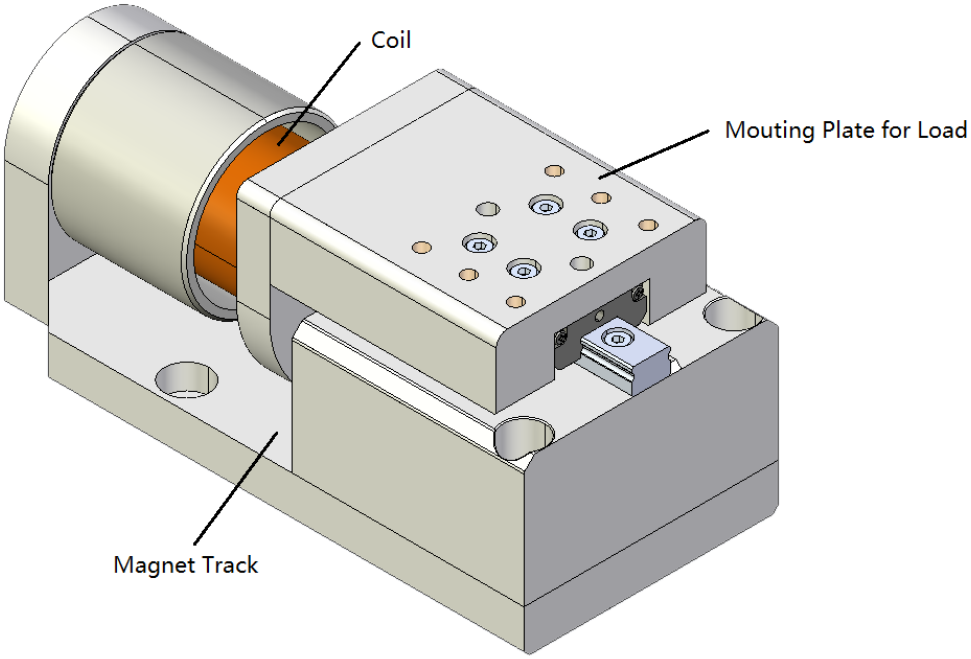

Fig. 3 MGV design

1.3.4 XRV Design

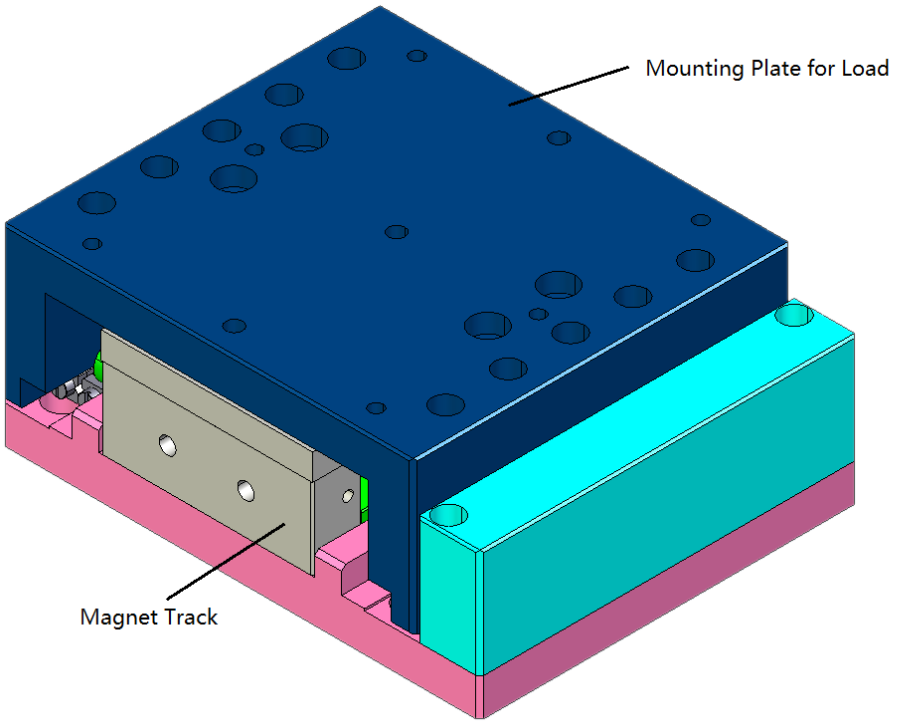

Fig. 4 XRV design

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1.3.5 DGV Design

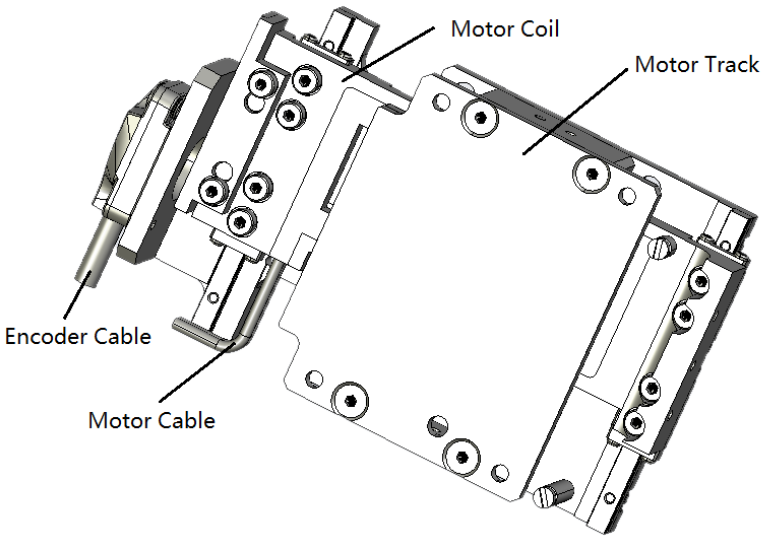

Fig. 5 DGV design

1.3.6 TGV Design

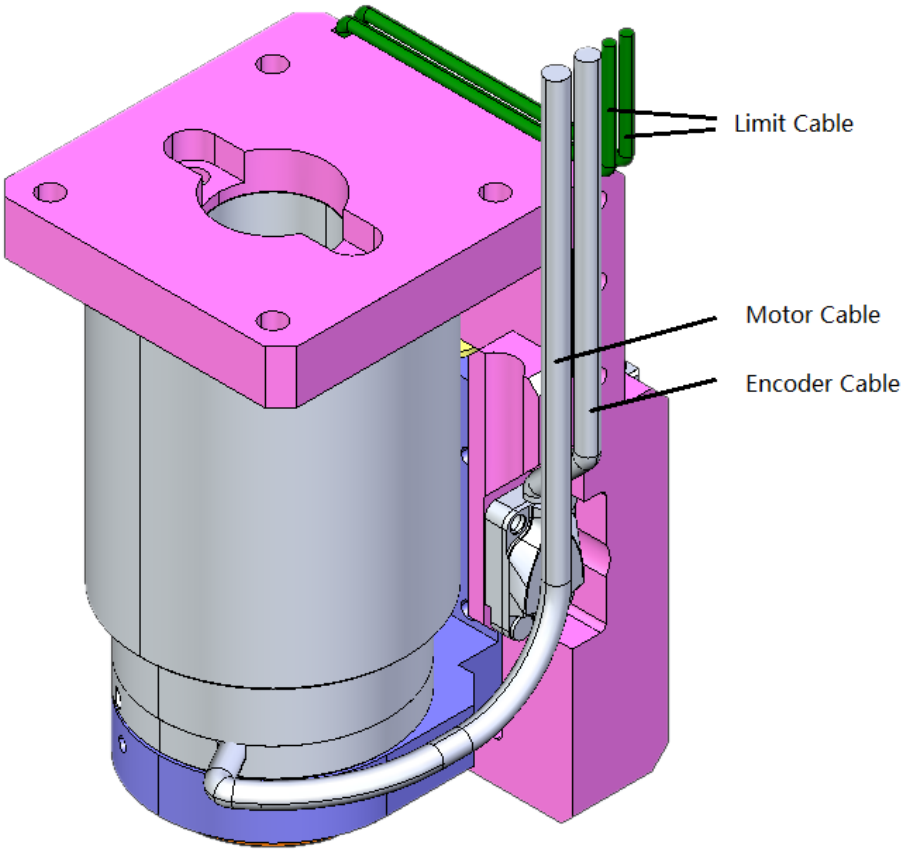

Fig. 6 TGV design

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1.3.7 AZT Design

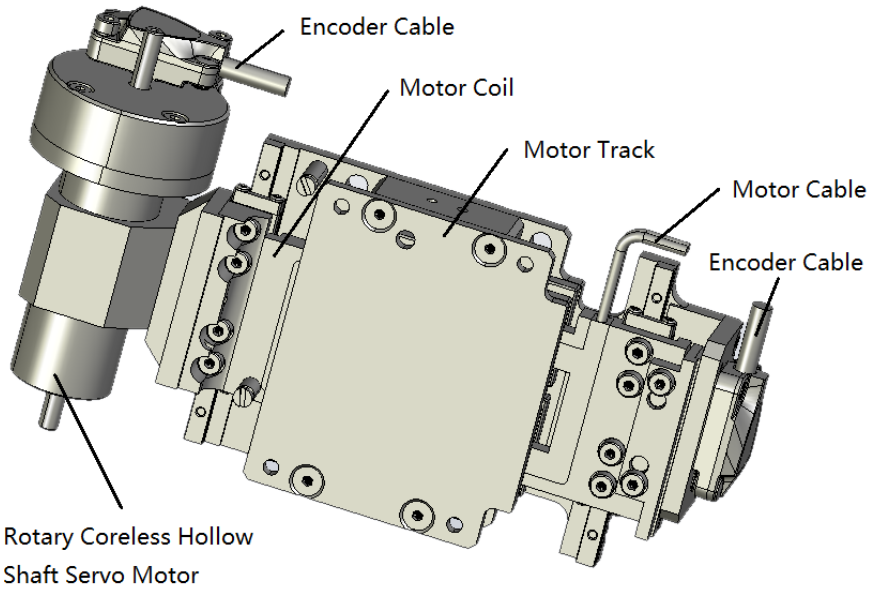

Fig. 7 AZT design

1.4 Protection Classes

The motor coils meet the requirements of the protection class according to EN 60529 and 60034-5.

Table 1: Table 1 Protection classes of the voice coil motor

Coil of voice coil motor	Protection class
AVM	IP20
AVA	IP20
MGV	IP20
XRV	IP20
DGV	IP20
TGV	IP20
AZT	IP20

1.5 Safety Precautions

Warnings and Important Safety Instructions in this instruction manual do not cover all possible conditions and situations that may occur. Be sure to read and understand the instructions in this manual. Only qualified personnel should attempt installation, operation and maintenance of electrical equipment. Failure to follow the safety instructions may result in personal injury or equipment damage.

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The safety precautions in this instruction manual are ranked as per below mentioned.

DANGER 	This indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
WARNING 	This indicates a potentially hazardous situation which, if not avoided, could result in serious injury or major damage to the equipment.
CAUTION 	This indicates a possible dangerous situation which, if not avoided, could lead to minor physical injury or damage to equipment.
WARNING 	This indicates a potentially hazardous situation which, if not avoided, could result in serious injury or major damage to the equipment.

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Chapter 2 - Safety

2.1 Safety Information

The following section describes the safety issues encountered while installing a voice coil motor and the precautions you can take to minimize risk.

CAUTION

Danger from heavy loads!
Lifting heavy load may damage your health
Use a host of an appropriate size when positioning heavy loads!
Observe applicable occupational health and safety regulations when handling suspended loads!

2.2 Before Unpacking

The package contains only Voice coil motor. Each Voice coil motor is carefully packaged for shipment. When you receive your motor, there are several things you should do immediately.

- Observe the condition of the shipping container and report any damage immediately to the carrier that delivered your motor.
- Verify that the part number of the motor received is the same as the part number listed on your purchase order.

2.3 Installation Environment

The Motor should be installed in an area that is protected from direct sunlight, corrosives, harmful gases or liquids and metallic particles. Exposure to these can reduce the operating life and thus degrade performance. Ventilation is extremely crucial. Be sure that the area for ventilation is not obstructed, as this will limit the air flow.

Motors will get warm and the heat must be dissipated to prevent damage. Be sure to allow clearance and access for cleaning, repair, service and inspections. These motors are water resistant, not water proof. Avoid submersion and contact with petroleum-based solvents. Do not use these motors in the presence of flammable atmospheric environment.

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2.4 Upon Unpacking

Each Akribis voice coil motor is packaged for ease of handling and to prevent entry of contaminants.

- To avoid condensation inside the motor, do not unpack until the motor has reached ambient room temperature.
- When the motor has reached ambient room temperature, remove all protective wrapping material from the motor. Handle all components with care, especially magnet plates which are sensitive to shocks.
- Always unpack and work on only one motor track at a time.

CAUTION 	Be careful when sliding the motor from its shipping container. Slide the motor from the box onto a flat, firm surface to prevent bending. Bending can damage the windings.

2.5 Magnet Track Handling

The magnets are exposed and the magnetic flux is very strong. These magnets are extremely powerful and special precautions need to be taken. Only qualified personnel should attempt installation, operation and maintenance of electrical equipment.

2.6 Safety Precautionary Notes

DANGER 	• Before installing the motor, make sure that the supply mains are grounded and operate with the safety regulations enforced. Do not touch electrical connections before you first ensure that power has been disconnected. Electrical shock can cause serious or fatal injury. • Before carrying out checks or doing any maintenance works, disconnect the supply mains voltage. Be sure that there is no possibility of accidental events. • Ensure that there is an effective protective earth. Make sure that there is no voltage at the terminals before connecting.

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WARNING 	• Any person with metal or electronic medical implants such as heart pacemaker should refrain from installing or working near the voice coil motors. • Use extreme caution when handling the motor tracks as the magnetic flux is very strong. These large attraction forces are very strong and cannot be controlled by hands. Hands or fingers may be severely injured. Restrain other body parts from these objects to avoid injury by this magnetic attraction. • Voice coil motors contain powerful permanent magnets which require extreme caution during handling. When handling multiple magnet tracks, do not allow the tracks to come in contact. • The surface temperature may exceed 50°C, resulting in a series of burns. Avoid touching the carriage housing during or shortly after operation.
CAUTION 	• Any person installing or working near the voice coil motor should not have any items such as watch, credit cards, keys, etc. that could be damaged by the magnetic field. • Always keep the vicinity around the voice coil motor clear of metal objects during installation and use non-magnetic tools for installation. • Use proper care and procedures that are safe during handling, lifting, installing, operating and maintaining operations. Improper methods may cause muscle strain or other bodily harm. • Always unpack and work on only one motor track at a time. Do not try to work on two or more loose magnet tracks. • The voice coil motor is powered by an amplifier. In case of a power disruption, this may automatically result in a free run out of the motor. Ensure precautions to prevent damage on the motor in the case of such an event. • The magnets shall never be exposed to temperatures above 80°C. They can become demagnetized at temperatures exceeding 80°C. • Wiring, maintenance and inspection work must be done by a qualified technician. • If at any time and any situation that there is any doubt about the safety of voice coil motor, do not use it and contact Akribis immediately.

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2.7 Label

Fig. 8 Motor Label

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Chapter 3 - Transport, Handling and Storage

3.1 Transport and Handling

CAUTION

The Voice coil motor must be transported flat and it is recommended to shipped in its original packaging.
Keep clear of ferro-magnetic objects during transport.
During transport, do not transport any additional loads on the voice coil motor.
Secure the voice coil motor components against tilting.

Warning

Any person installing or working near the voice coil motor should not have any items such as watch, credit card, keys etc. that could be damaged by the magnetic field.

Warning

Must be handled by qualified staff wearing personal protective equipment (gloves, safety shoes, etc.)
Never pull or hold the motor by its cable
The motor must not suffer any kind of shock or stress during handling

3.2 Storage and Transport Conditions

Table 2 Temperature for storage and Transport

Parameters	Voice coil motor components
Storage Temperature	5°C to 40°C
Transport Temperature	-20°C to 60°C
Humidity (Non-Condensing)	5% to 85% RH

Keep clear of ferro-magnetic objects, and magnetic part of the motor to be separated in non-magnetic protection.

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Chapter 4 - Assembly and Connection

The voice coil motor may only be assembled by specialist personnel. Prior to installation, screws are required for positioning and connecting the coil unit to the bearing as well as connecting the motor rotor and stator to the mounting frame. In addition, the following tools are necessary for the installation such as:

- Allen key set
- Protective gloves

Ambient conditions

Ambient temperature:	+5°C to 40°C
Installation site:	flat, dry, vibration-free
Atmosphere:	not corrosive, not explosive

Safety equipment to be provided by the operator

Possible safety equipment/measures:

- Personal protective equipment in accordance with UW (German accident prevention regulations)
- Zero-contact protective equipment
- Mechanical protective equipment

Warning

Be sure to understand and follow the instructions in this manual. A different method of installation may cause a dangerous situation and injuries due to the uncontrolled magnetic attraction forces.

Warning

Use extreme caution when handling the motor tracks as the magnetic flux is very strong. These large attraction forces cannot be controlled by hands.

Severe Hands or Fingers Injury may occur.

Strongly advised that personnel with heart pacer or medical device that could be interfered by the strong magnetic field be prohibited from handling these magnet tracks.

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4.1 Unpacking

The package contains only voice coil motor. Each voice coil motor is carefully packaged for shipment. Before you unpack, there are several things you should do immediately.

- Observe the condition of the shipping container and report any damage immediately to the carrier that delivered your motor.
- Verify that the part number of the motor received is the same as the part number listed on your purchase order.

CAUTION

Be careful when sliding the motor from its shipping container. Slide the motor from the box onto a flat, firm surface to prevent bending. Bending can damage the windings.

Warning

Use extreme caution when handling the motor rotor as the magnetic flux is very strong. These large attraction forces cannot be controlled by hands.

Do not place Hands or Fingers between the motor rotors, Severe Hands or Fingers Injury may occur.

Warning

Any person installing or working near the voice coil motor should not have any items such as watch, credit card, keys etc. that could be damaged by the magnetic field.

Strongly advised that personnel with heart pacer or medical device that could be interfered by the strong magnetic field be prohibited from handling these magnet tracks.

Each Akribis voice coil motor is packaged for ease of handling and to prevent entry of contaminants.

- To avoid condensation inside the motor, do not unpack until the motor has reached ambient room temperature.
- When the motor has reached ambient room temperature, remove all protective wrapping material from the motor. Handle all components with care, especially magnet plates which are sensitive to shocks.
- Always unpack and work on only one motor track at a time.

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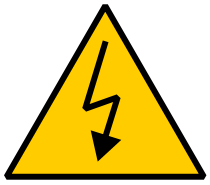
4.2 Assembling voice coil motor component

Danger



Danger from electrical voltage
Before and during assembly, disassembly and repair work, dangerous currents may flow
Work may only be carried out by a qualified electrician and with the power supply disconnected!
Before carrying out work on the voice coil motor, disconnect the power supply and protect it from being switched back on!

4.2.1 Motor Structure

The actuator comprises of two major components, which are called the coil and the core respectively. The coil consists of windings and its supportive structure which provides the electric excitation of the actuator. The core is constructed from steel with high-performance permanent magnets attached onto it. The working mode of moving coil is preferred in many applications since it has the advantage of low moving mass and quick response. However, in other applications, moving magnet mode is also feasible.

For the actuator size, outline dimensions and the standard mounting hole dimensions of a specific AVM actuator, please refer to the Akribis Catalogue.

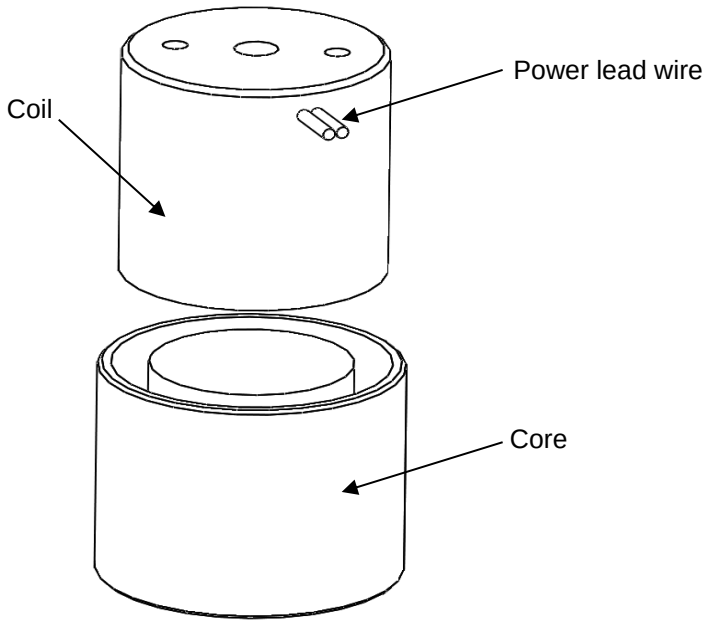


Fig. 9 Structure of AVM

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4.2.2 User Interface

The user is responsible for the design of guiding system, feedback system, driver system, material selection, fit calculations and tolerance analysis based on the needs of the intended application.

4.2.3 Coil Mounting

The coil can be mounted to any structure made from materials with a good thermal conductivity for heat sinking purpose and offers sufficient mechanical rigidity for the coil to be mounted securely onto it. Aluminum alloys are the commonly used material due to their excellent thermal conductivity and the light density with sufficient structural strength.

CAUTION

Be careful when sliding the motor from its shipping container. Slide the motor from the box onto a flat, firm surface to prevent bending. Bending can damage the windings.

CAUTION

Danger from heavy loads!
Lifting heavy load may damage your health
Use a host of an appropriate size when positioning heavy loads!
Observe applicable occupational health and safety regulations when handling suspended loads!

Coil Mounting Method

Akribis recommends the fasteners mounting/ bolting method for AVM coil, and all AVM coils are provided with tapped holes on the top surface. Dimension details of the mounting tapped holes are shown in the Akribis Catalogue.

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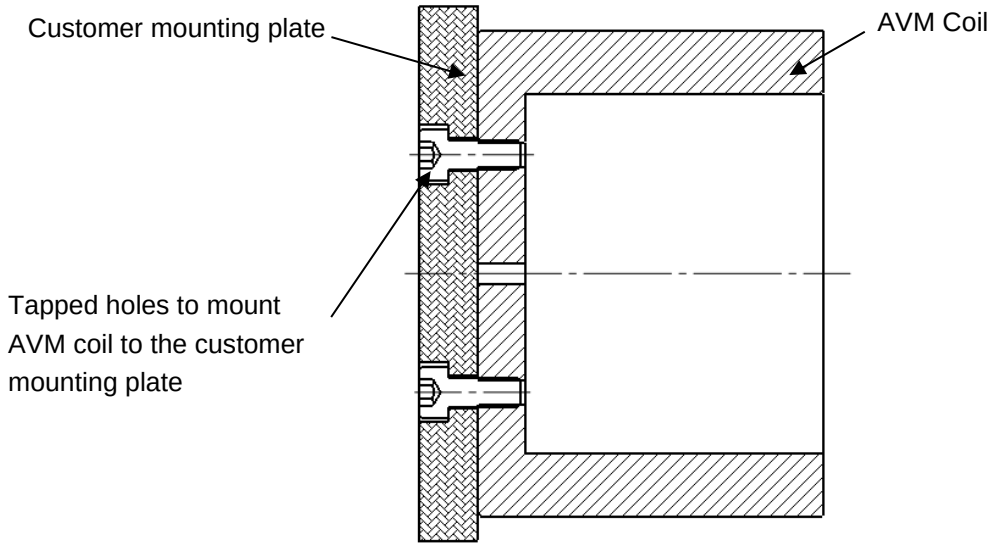

Fig. 10 2 Example of AVM coil mounting method

4.2.4 Core Mounting

The core can be mounted to any structure that is strong and hard enough for the intended use.

CAUTION

Be careful when sliding the motor from its shipping container. Slide the motor from the box onto a flat, firm surface to prevent bending. Bending can damage the magnets.

Warning

Use extreme caution when handling the motor rotor as the magnetic flux is very strong. These large attraction forces cannot be controlled by hands.

Do not place Hands or Fingers between the motor rotors, Severe Hands or Fingers Injury may occur.

Warning

Any person installing or working near the voice coil motor should not have any items such as watch, credit card, keys etc. that could be damaged by the magnetic field.

Strongly advised that personnel with heart pacer or medical device that could be interfered by the strong magnetic field be prohibited from handling these magnet tracks.

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Core Mounting Method

CAUTION

Danger from heavy loads!
Lifting heavy load may damage your health
Use a host of an appropriate size when positioning heavy loads!
Observe applicable occupational health and safety regulations when handling suspended loads!

Akribis recommends the fasteners mounting/bolting method for AVM core, and all AVM cores are provided with tapped holes on the bottom surface.

For the dimension details (Holes PCD, Hole size, Hole quantity, etc.) of the mounting tapped holes, please refer to the Akribis Catalogue.

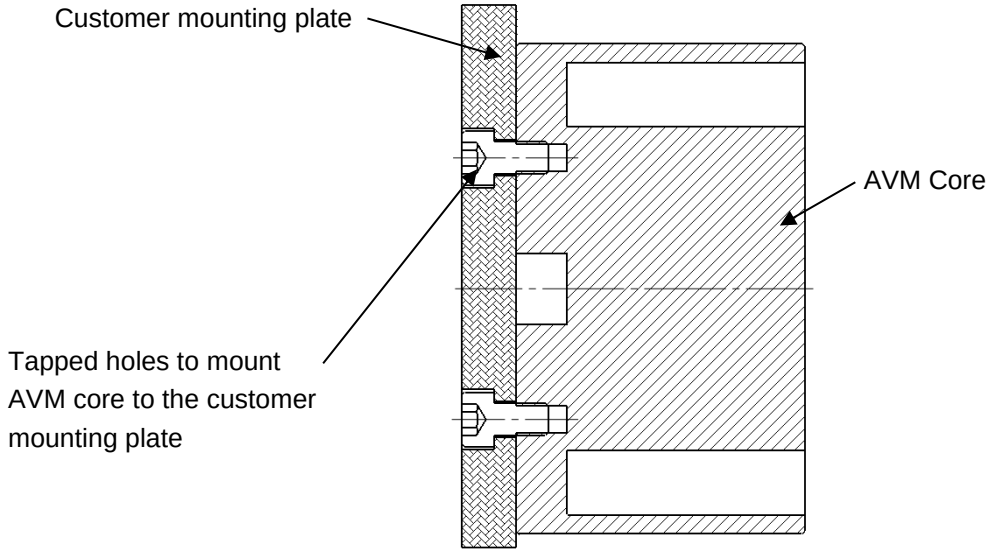

Fig. 11 Example of AVM core mounting method

4.2.5 Coil to Core Assembly

Safety Precaution

CAUTION

Put the coil and core onto a flat, firm surface to prevent bending. Bending can damage the magnets and windings.

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Warning

Use extreme caution when handling the motor coil as the magnetic flux is very strong. These large attraction forces cannot be controlled by hands.

Do not place Hands or Fingers between the motor core, Severe Hands or Fingers Injury may occur.

Warning

Any person installing or working near the voice coil motor should not have any items such as watch, credit card, keys etc. that could be damaged by the magnetic field.

Strongly advised that personnel with heart pacer or medical device that could be interfered by the strong magnetic field be prohibited from handling these magnet tracks.

Pre-preparation: Secure the Stator and Running Gap Surfaces Protection

Here we take moving-coil mode as an example. In this mode, the core is stationary, called stator, and the coil is in motion, called mover. The same idea can be applied to the moving-core mode.

The user needs to ensure that the stator is securely mounted before the attempt to install the mover.

During the attempts to install the mover to the stator, it is important to keep the two parts concentric and contact free. Otherwise it may cause damage to the gap running surfaces during motion.

The running gaps of AVM actuators range from 0.3 mm to 1.0 mm depending on the size of the actuator.

It is recommended to tie and place the lead wire aside in a safe position to avoid damage to the wires during installation.

Warning

For safety reason, it is not recommended to lift the rotor by hand as the attraction force can be too strong to control by hand when the rotor enters the stator. Akribis recommends a lifting device to be used to lift the rotor into position and stabilize it for insertion into the stator.

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Running Gap Inspection

After the mover is installed and secured properly, inspect the running gap for any debris or particles that might obstruct the relative motion between the coil and core.

Lastly, move the mover slowly to confirm that the two parts are contact free.

Technical Assistance

Customers may contact the nearest Akribis office for any application and installation assistance.

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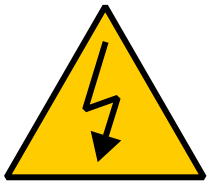
4.3 Assembling voice coil table

CAUTION

Be careful when sliding the motor from its shipping container. Slide the motor from the box onto a flat, firm surface to prevent bending. Bending can damage the magnets.

Danger



Danger from electrical voltage
Before and during assembly, disassembly and repair work, dangerous currents may flow
Work may only be carried out by a qualified electrician and with the power supply disconnected!
Before carrying out work on the voice coil table, disconnect the power supply and protect it from being switched back on!

Warning

Any person installing or working near the voice coil table should not have any items such as watch, credit card, keys etc. that could be damaged by the magnetic field.

Strongly advised that personnel with heart pacer or medical device that could be interfered by the strong magnetic field be prohibited from handling these magnet tracks.

CAUTION

Danger from heavy loads!
Lifting heavy load may damage your health
Use a host of an appropriate size when positioning heavy loads!
Observe applicable occupational health and safety regulations when handling suspended loads!

The voice coil motor module is secured as standard from below.

- Mounting holes in the mounting surface in accordance with dimensional drawing (see Chapter 9)
- Clean mounting surface
- Position the voice coil motor module on the mounting holes.
- Insert the mounting bolts in the mounting holes, and tighten them a crosswise fashion, noting the maximum torque.

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4.4 Cable Specifications

4.4.1 Motor Cable

The min. bending radius (Fixed Laying) of motor cable is 6 times Outer Diameter of motor cable.

Table 3 Voice coil motor cable size

Motor Type	Outer diameter of Single Wire (mm)	No of wires (mm^2)
AVM12-6.4 / AVM19-5 / AVM20-10 AVM24-5 / AVM24-10 / AVM30-15 AVM40-20 / AVM14-10-C56 AVM20-HF-6-C28 / AVM24-HF-5-C13 AVM30-7-C60 / AVM35-HF-15-C22 AVM35-HF-8-C35 / AVM40-20-C18 AVM35-HF-10-C31 / AVA1-20 / AVA2-20	1.0	2 x 26AWG
ATA-IG3-6 / ATA-IG3-12 / ATA-IG4-10 ATA-IG4-18 / ATA-IG5-12 / ATA-IG5-12	1.25	2 x 26AWG
AVM35-HF-7 / AVM40-HF-6.5 / AVA1-C2-10	0.7	2 x 25AWG
AVM60-25 / AVM50-HF-10 / AVM60-HF-10	1.2	2 x 22AWG
AVM40-HF-6.4-C11-A / AVM50-HF-10-C15-A AVM50-HF-10-C34-A / AVA3-20	1.3	2 x 22AWG
AVM80-12-C8	1.5	2 x 20AWG
AVM90-30 / AVM90-HF-10 / AVM100-HF-10 / AVM130-HF-25	1.6	2 x 18AWG
AVM75-HF-25-C12 / AVM75-38-C39 AVM90-30-C77 / AVM90-HF-5-C40-A AVM150-HF-20-C53	1.8	2 x 16AWG
AVM130-HF-10-C29-A / AVM250-HF-20	1.8	4 x 18AWG

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4.4.2 Extension Cable

ELECTRICAL CONNECTION - MOTOR EXTENSION RECOMMENDATION

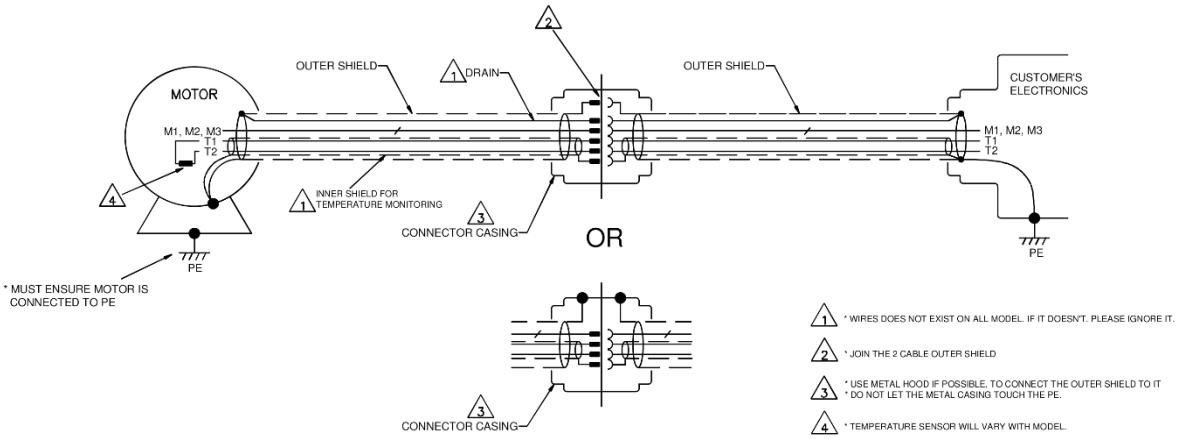

Fig. 12 Example for motor extension cable

ELECTRICAL CONNECTION - HALL EXTENSION RECOMMENDATION

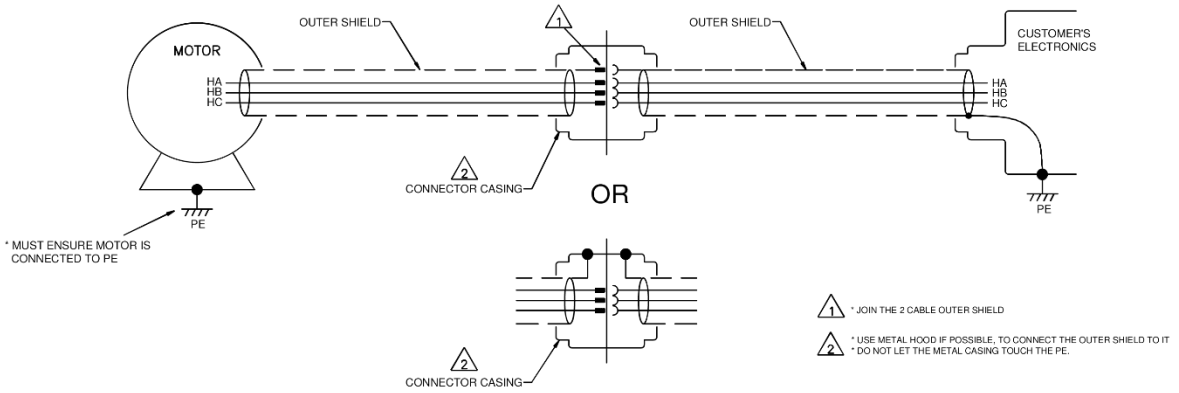

Fig. 13 Example for hall extension cable

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4.5 Encoder Pinout

ABI11(digital Encoder):

Table 4 ABI11 Pinout

Pin	Signal
4	A-
5	A+
9	B-
10	B+
12	+5V
13	GND
14	Ind+
15	Ind-

ABI22(analog Encoder):

Table 5 ABI22 Pinout

Pin	Signal
1	Ind-
2	Ind+
7	Cos+
8	Sin+
12	+5V
13	GND
14	Cos-
15	Sin-

About more Information you can find in Capital 10.

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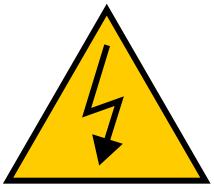
Chapter 5 - Commissioning

5.1 Measures Prior to Commissioning

Before commissioning the Voice coil motor, check that it is properly installed and connected. The operator should provide a controller pursuant to DIN EN ISO 12100 that prevents the machine from being started up unintentionally after power is restored, troubleshooting or the machine is stopped.

5.1.1 Mechanical Connection

Danger



Make sure that the equipment is de-energized and in a no-voltage condition

Make sure that:

- Touch protection measures are in place for moving and live parts.
- The motor has been correctly installed and aligned.
- The moving part can push without coming into contact with other parts and components.
- The operating conditions correspond to the data specified on the rating plate.
- All fixing screws, connecting elements, and electrical connections are tight and have been attached properly.

5.1.2 Electrical Connection

Make sure that:

- The grounding and equipotential bonding connections have been established correctly.
- The brake is perfectly.
- The specified speed, current and max. position error limit and is not exceeded when operated from a controller.

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5.1.3 Monitoring Equipment

Make sure that:

- Appropriately configured control and speed monitoring functions are being used to ensure that the motor cannot exceed the permissible speeds specified on the rating plate.
- Any supplementary motor monitoring devices and equipment have been correctly connected and are fully functional.

5.2 Servo On

Before you servo on the motor, ensure that the parameters of drive and controller have been assigned correctly.

CAUTION

Uneven running or abnormal noises

The motor can be damaged by improper handling during transport, storage or installation. If a damaged motor is operated, this can damage the winding or bearings and could even destroy the systems.

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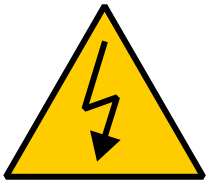
Chapter 6 - Inspection and Maintenance

6.1 Safety Instructions

If you are unclear about anything, consult the manufacturer, specifying the motor type and seral number, or arrange for the maintenance work to be carried out by one of Akribis Systems.

Danger



Danger from electrical voltage
Before and during assembly, disassembly and repair work, dangerous currents may flow
Work may only be carried out by a qualified electrician and with the power supply disconnected!
Before carrying out work on the voice coil motor, disconnect the power supply and protect it from being switched back on!

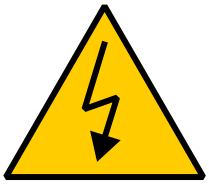
Before you start maintenance work und you must check below:

- Disconnect the systems
- Disconnect the power supply of the voice coil motor
- Ensure that permissible ambient conditions, voltage and current load are observed
- Protect against reconnection
- Cover or enclose adjacent components that are still live

6.2 Clean

Blow show how can the customer cleaning the voice coil motor component. For voice coil motor table can just cleaning the surface. If you want to full clean, please contact with Akribis Systems.

Danger



Danger from electrical voltage
Before and during assembly, disassembly and repair work, dangerous currents may flow
Work may only be carried out by a qualified electrician and with the power supply disconnected!
Before carrying out work on the torque motor, disconnect the power supply and protect it from being switched back on!

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Dirt can settle and accumulate over time on the voice coil motors.
The voice coil motor components must therefore be regularly checked for dirt. Dirt can affect heat dissipation and block.
Clean dirt if necessary, e.g. using isopropyl alcohol. Using aggressive media for cleaning creates the risk of injury and of damaging the voice coil motor components.

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Chapter 7 - Troubleshooting

There can be a large number of different reasons for a fault, depending on the particular conditions in your system. The fault causes described below are mostly those which directly influence the motor. The information contained in the report files will enable Technical Support to troubleshoot your problem and provide assistance.

Table 6 Error analyze

Error	Possible Causes	Rectify Actions
Motor will not move	Servo drive not enabled	Apply signal to servo drive
	Usually Power line trouble	Check power source
	Under Voltage	Check voltage at motor terminals
Regular clicking	Foreign matter in air gap.	Remove foreign matter.
Vibration	Mis-Alignment in guide rails and motor tracks	Realign motor and driven equipment
	Excessive load	Reduce load and verify for vibration. Eliminate source
Motor overheating (Check temperature with thermocouple, do not depend on touch)	Over / Under voltage	Check voltage and eliminate source
	Dirt in motor	Check flow of air. Clean motor
	Improper electrical connections	Recheck electrical connections
	Air Recirculation	Check air intake and exhaust for obstructions. Check air inlet temperature.
Motor turns in the wrong direction	Encoder setting wrong	Check setting
	Input phase fault	Change over two phases on the motor
Motor hums and has a high current consumption	Motor coil is jammed	Check motor rotor
	Brake is jammed	Check air pressure and power supply
	Fault in encoder cable	Check encoder cable
	Problem with motor insulation	Check resistance values ＞50MΩ (phase/earth and phase/sensor)

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Chapter 8 - Disposal

Table 7 Disposal

Fluids	
Lubricants	Dispose of as hazardous waste in an environmentally friendly way
Soiled cleaning cloths	Dispose of as hazardous waste in an environmentally friendly way
Voice coil motor	
Cabling, electrical components	Dispose of as electrical waste
Polypropylene (PP) components	Dispose of separately
Aluminum components (housing)	Dispose of separately
Iron components	Dispose of separately
Copper components	Dispose of separately
Brass, nickel-plated components (plug connector materials)	Dispose of separately
Nitrile butadiene rubber (NBR) components (seals)	Dispose of separately
Stainless steel components (bolts)	Dispose of separately

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9.1 AVM Motor

AVM Standard Series

Model	Units	AVM12-6.4	AVM19-5	AVM 20-10	AVM24-5	AVM24-10
Stroke	mm	6.4	5	10	5	10
Force sensitivity (at mid stroke)	N/A	0.57	1.75	2.00	3.00	3.90
Back EMF constant	V/(m/s)	0.57	1.75	2.00	3.00	3.90
Continuous force (at 100 °C) ①	N	0.91	1.75	1.56	2.10	2.65
Peak force	N	3.53	7.88	7.60	11.40	14.82
Resistance ②	ohms	1.13	2.23	3.59	3.09	5.86
Inductance ②	mH	0.09	0.27	0.50	0.51	1.23
Voltage at peak force	V	7.01	10.04	13.64	11.7	22.3
Continuous current (coil at 100 °C)	A	1.60	1.00	0.78	0.70	0.68
Peak current	A	6.20	4.50	3.80	3.80	3.80
Max voltage	Vdc	60	60	60	60	60
Actuator constant	N/Sqrt(W)	0.54	1.17	1.06	1.71	1.61
Continuous power	W	2.89	2.23	2.18	1.51	2.71
Electrical time constant	ms	0.08	0.12	0.14	0.17	0.21
Mechanical time constant	ms	17.39	6.55	9.87	4.12	6.36
Clearance of coil	mm	0.35	0.40	0.50	0.50	0.50
Power at peak force	W	43.44	45.16	51.84	44.62	84.62
Thermal dissipation constant	W/°C	0.039	0.030	0.029	0.020	0.036
Max coil temperature	°C	100	100	100	100	100
Coil assembly mass	g	5.0	9.0	11.0	12.0	16.5
Core assembly mass	g	7.3	23.8	45.1	29.7	45.0

① Continuous force measured without any additional mounting plate or heat sink on coil

② Measured at 25 °C

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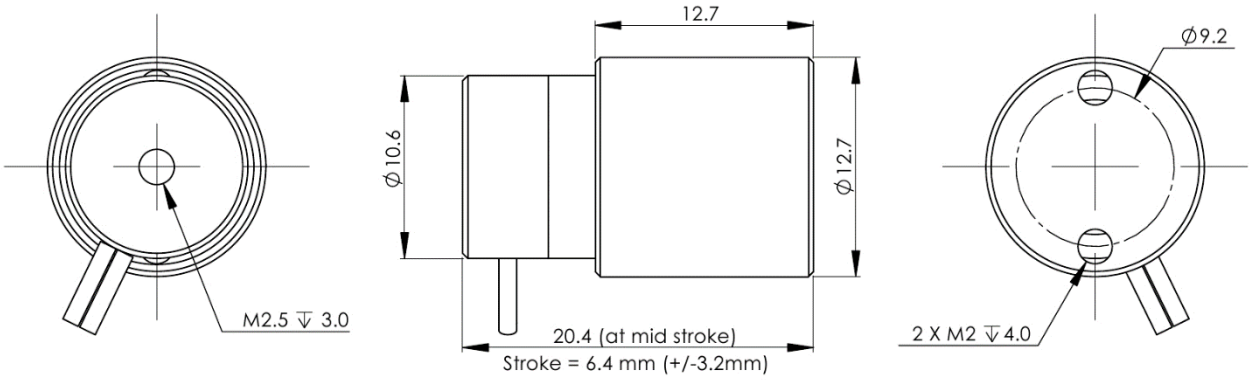
Model	Units	AVM 30-15	AVM 40-20	AVM 60-25	AVM 90-30
Stroke	mm	15	20	25	30
Force sensitivity (at mid stroke)	N/A	7.35	12.90	17.00	22.50
Back EMF constant	V/(m/s)	7.35	12.90	17.00	22.50
Continuous force (at 100 °C) ①	N	4.63	9.93	26.35	89.10
Peak force	N	29.40	58.05	119.00	315.00
Resistance ②	ohms	10.22	12.10	5.37	2.70
Inductance ②	mH	2.63	5.12	3.73	3.20
Voltage at peak force	V	40.88	54.45	37.59	37.8
Continuous current (coil at 100 °C)	A	0.63	0.77	1.55	3.96
Peak current	A	4.00	4.50	7.00	14.00
Max voltage	Vdc	60	60	60	120
Actuator constant	N/Sqrt(W)	2.30	3.71	7.34	13.69
Continuous power	W	4.06	7.17	12.90	42.34
Electrical time constant	ms	0.26	0.42	0.69	1.19
Mechanical time constant	ms	6.81	4.87	3.99	4.37
Clearance of coil	mm	0.60	0.60	0.70	0.65
Power at peak force	W	163.52	245.03	263.13	529.20
Thermal dissipation constant	W/°C	0.054	0.096	0.172	0.565
Max coil temperature	°C	100	100	100	100
Coil assembly mass	g	36.0	67.0	215.0	820.0
Core assembly mass	g	95.6	226.2	692.9	1750.0

① Continuous force measured without any additional mounting plate or heat sink on coil

② Measured at 25 °C

AVM 12-6.4



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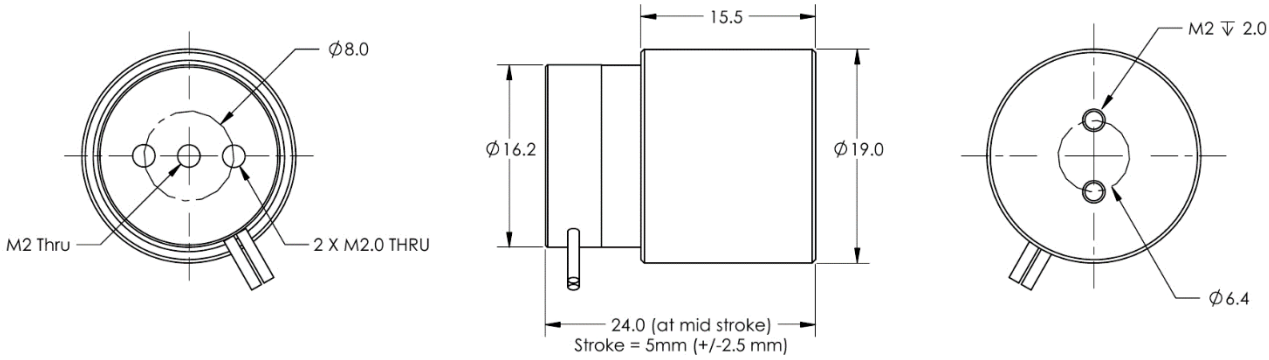
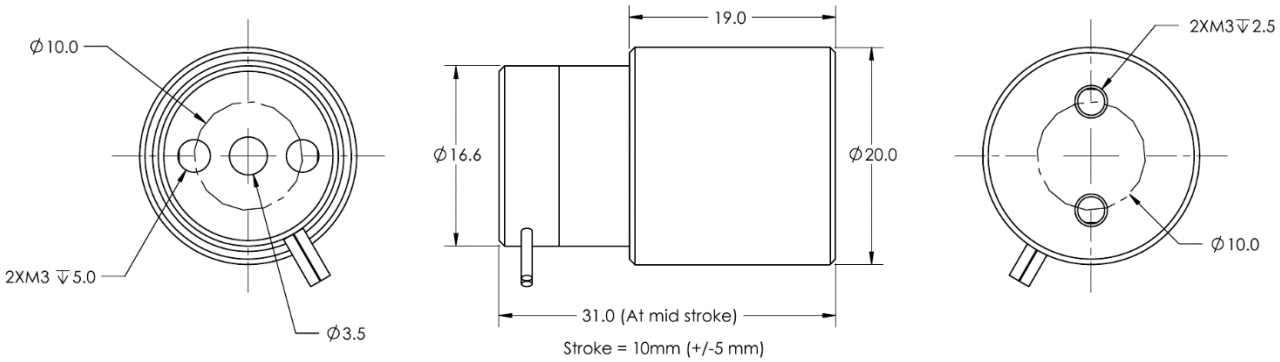
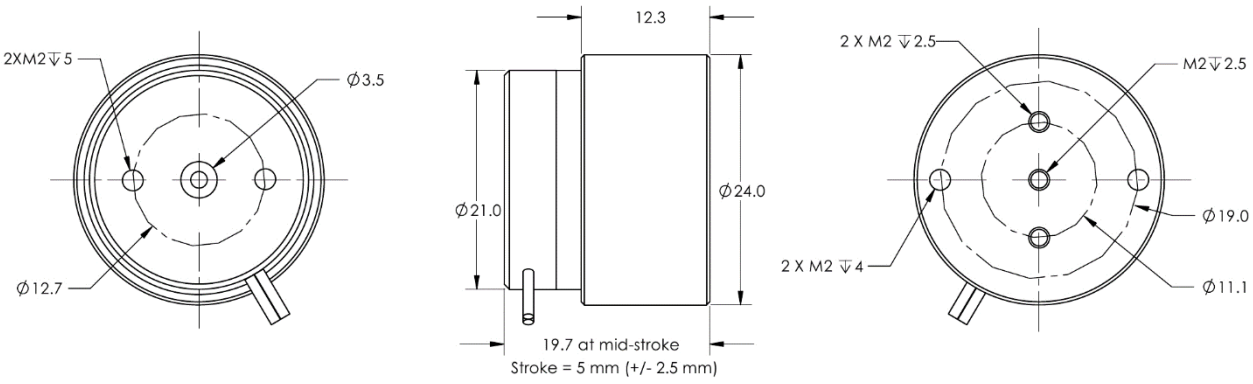
AVM 19-5



AVM 20-10



AVM 24-5



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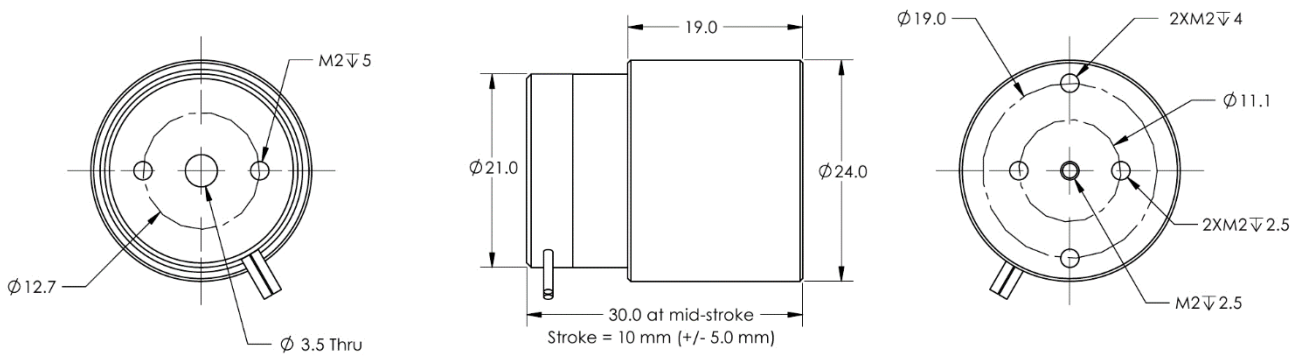
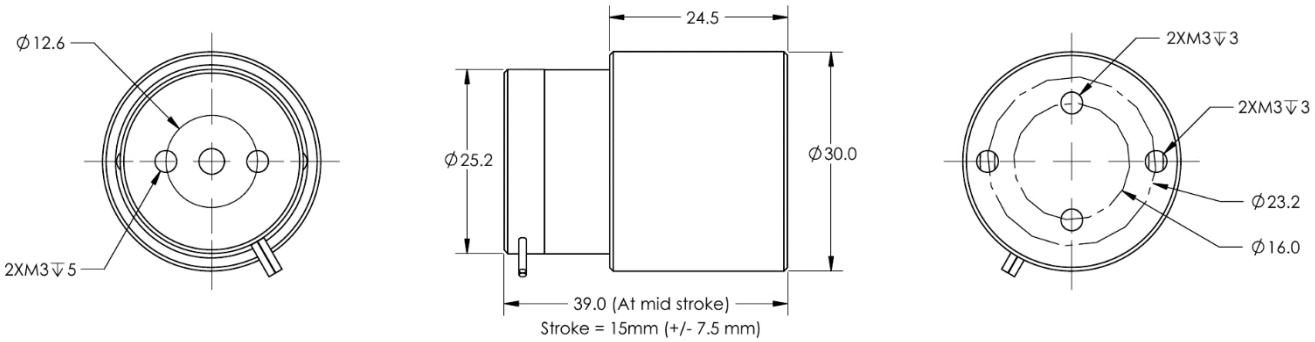
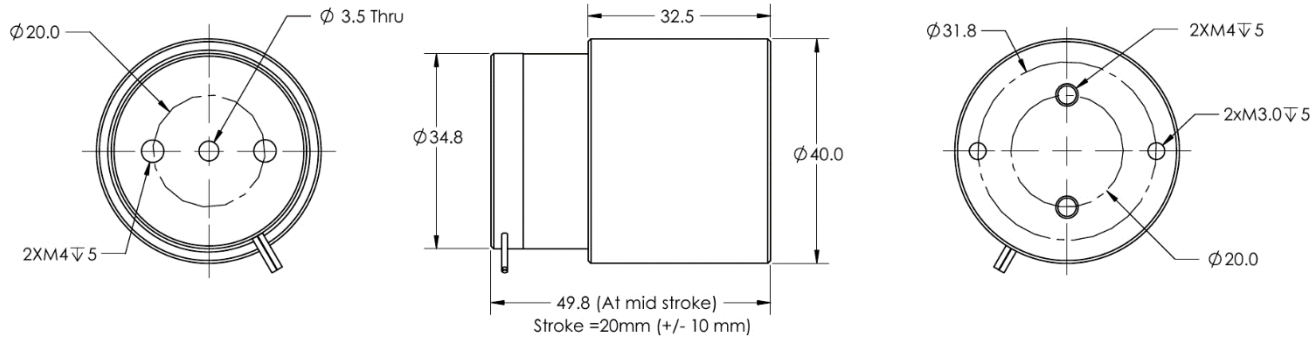
AVM 24-10



AVM 30-15



AVM 40-20



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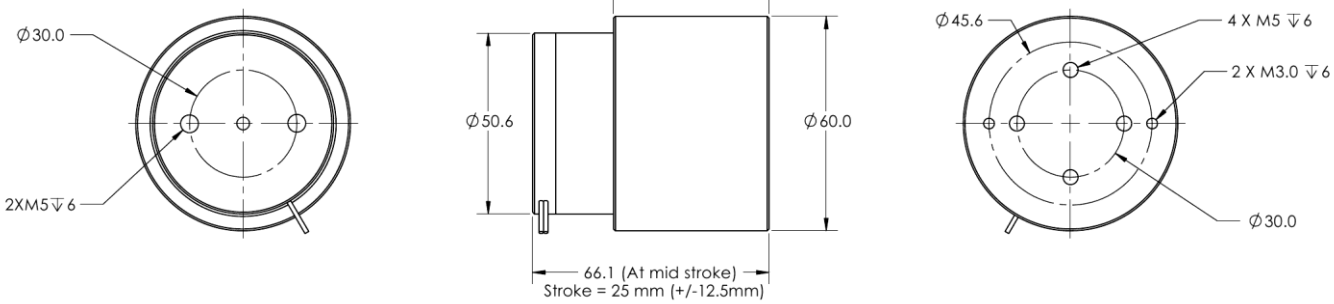
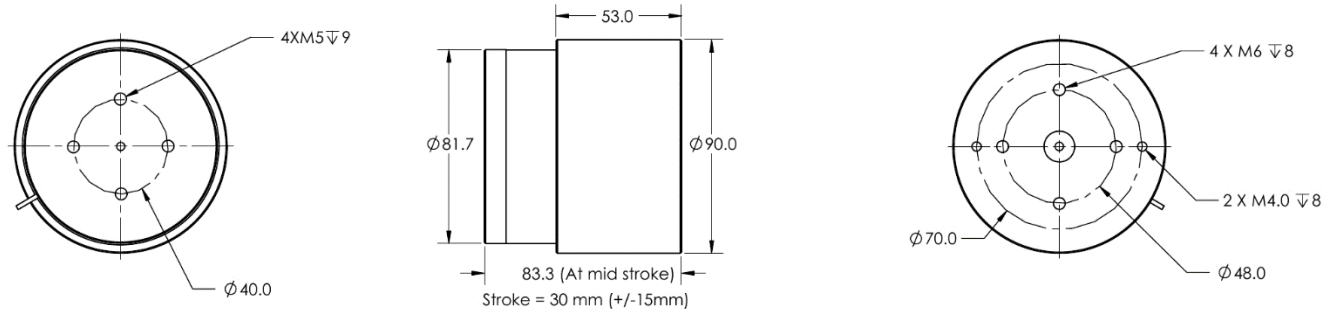
AVM 60-25



AVM 90-30



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AVM High Force Series (Patented Design)

Model	Units	AVM35-HF-7	AVM 40-HF-6.5	AVM 50-HF-10	AVM60-HF-10
Stroke	mm	7	6.5	10	10
Force sensitivity (at mid stroke)	N/A	16.00	20.70	28.00	32.00
Back EMF constant	V/(m/s)	16.00	20.70	28.00	32.00
Continuous force (at 100 °C) ①	N	14.40	16.56	33.60	51.20
Peak force	N	72.00	93.15	140.00	224.00
Resistance ②	ohms	9.80	11.31	8.64	5.91
Inductance ②	mH	3.60	4.47	5.30	4.01
Voltage at peak force	V	44.10	50.90	43.20	41.4
Continuous current (coil at 100 °C)	A	0.90	0.80	1.20	1.60
Peak current	A	4.50	4.50	5.00	7.00
Max voltage	Vdc	60	60	60	60
Actuator constant	N/Sqrt(W)	5.11	6.16	9.53	13.16
Continuous power	W	7.14	7.24	12.44	15.13
Electrical time constant	ms	0.37	0.40	0.61	0.68
Mechanical time constant	ms	2.03	1.79	1.63	1.36
Clearance of coil	mm	0.50	0.60	0.60	0.70
Power at peak force	W	198.45	229.03	216.00	289.59
Thermal dissipation constant	W/°C	0.095	0.097	0.166	0.202
Max coil temperature	°C	100	100	100	100
Coil assembly mass	g	53.0	68.0	148.0	236.5
Core assembly mass	g	146.8	218.7	553.0	997.0

Model	Units	AVM 90-HF-10	AVM 100-HF-10	AVM 130-HF-25	AVM250-HF-20
Stroke	mm	10	10	25	20
Force sensitivity (at mid stroke)	N/A	43.62	55.00	54.60	168.40
Back EMF constant	V/(m/s)	43.62	55.00	54.60	168.40
Continuous force (at 100 °C) ①	N	152.67	192.50	360.36	1111.44
Peak force	N	610.68	770.00	764.40	4715.20
Resistance ②	ohms	2.90	3.20	1.48	3.70
Inductance ②	mH	3.59	4.12	1.70	5.00
Voltage at peak force	V	40.60	44.80	20.72	103.6
Continuous current (coil at 100 °C)	A	3.50	3.50	6.60	6.60
Peak current	A	14.00	14.00	14.00	28.00
Max voltage	Vdc	120	120	120	120
Actuator constant	N/Sqrt(W)	25.61	30.75	44.88	87.55
Continuous power	W	35.53	39.20	64.47	161.17
Electrical time constant	ms	1.24	1.29	1.15	1.35
Mechanical time constant	ms	1.46	1.18	0.77	0.77
Clearance of coil	mm	0.65	0.65	0.55	0.90
Power at peak force	W	568.40	627.20	290.08	2900.80
Thermal dissipation constant	W/°C	0.474	0.523	0.860	2.149
Max coil temperature	°C	100	100	100	100
Coil assembly mass	g	960.0	1117.0	1550.0	5900.0
Core assembly mass	g	2400.0	3300.0	9300.0	27200.0

① Continuous force measured without any additional mounting plate or heat sink on coil

② Measured at 25 °C

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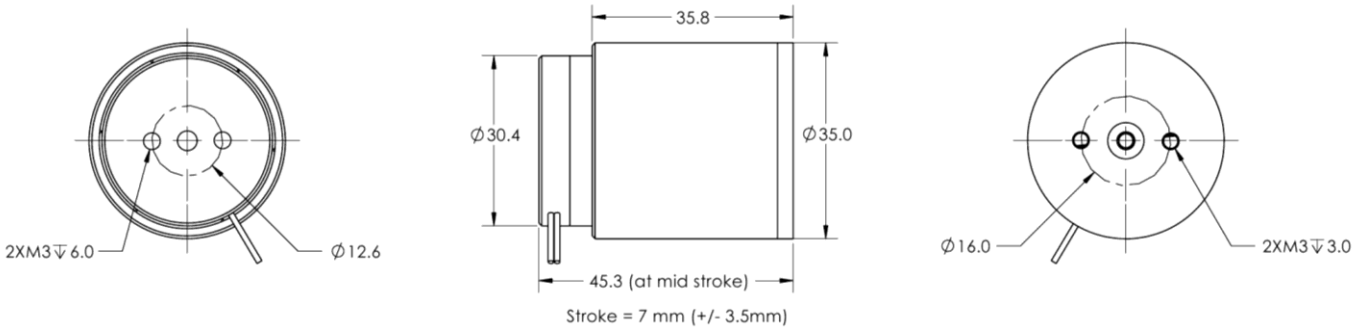
AVM 35-HF-7



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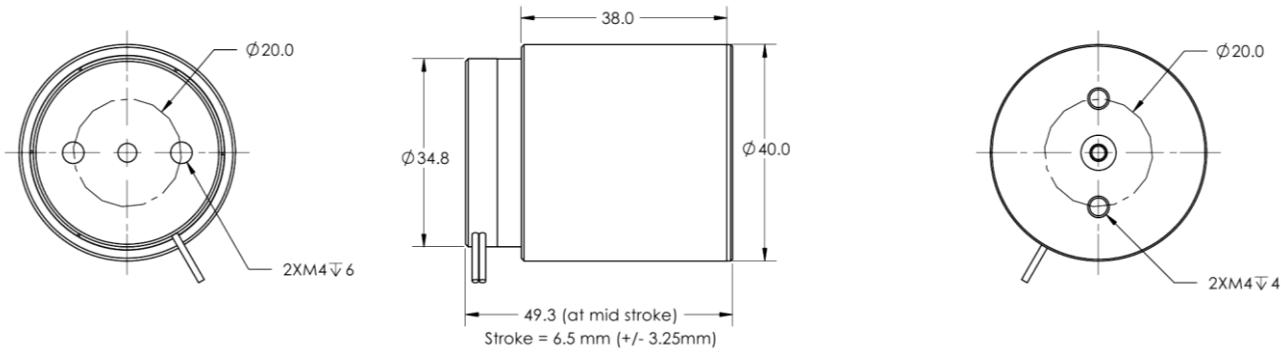
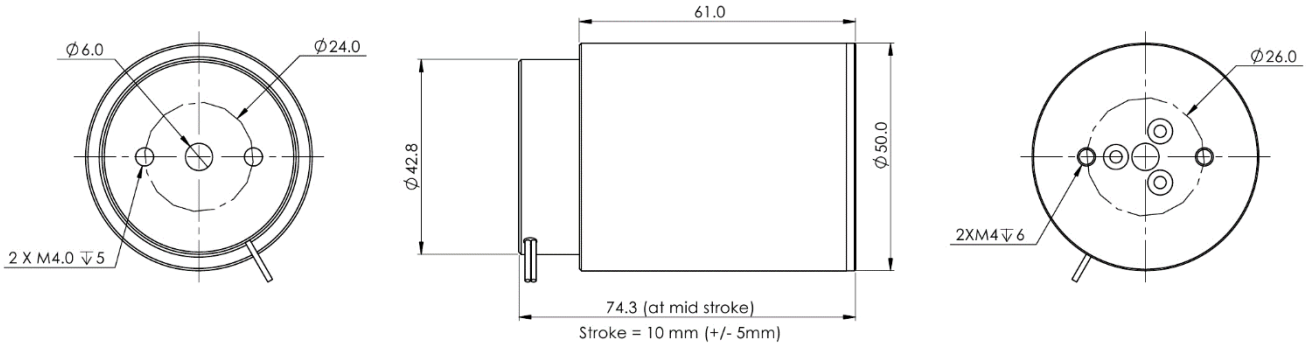


AVM 50-HF-10



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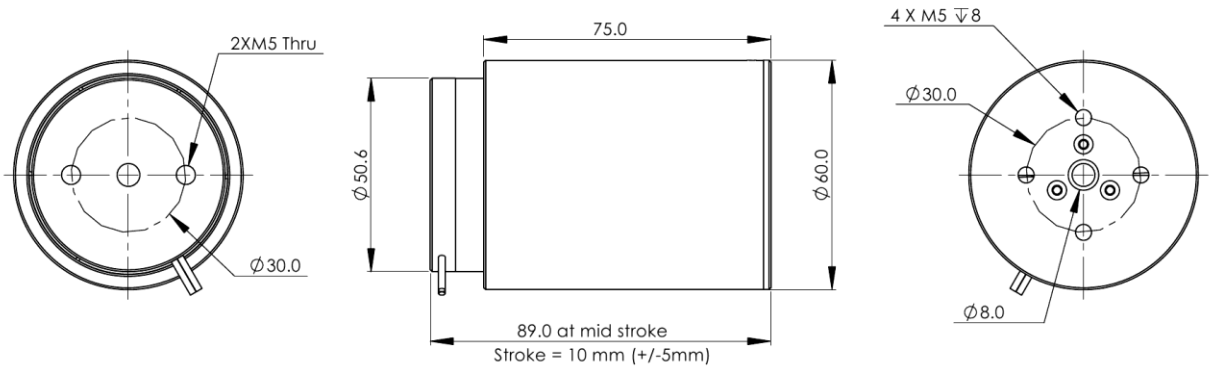
AVM 60-HF-10



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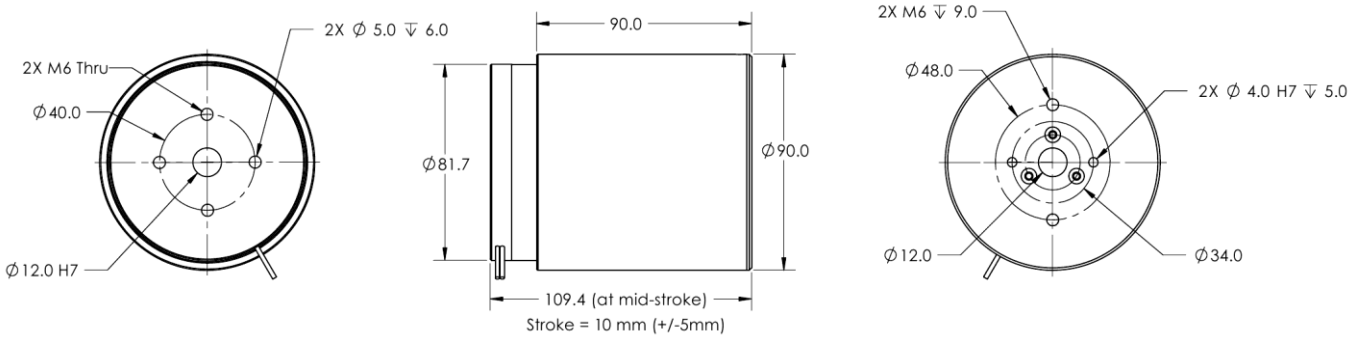

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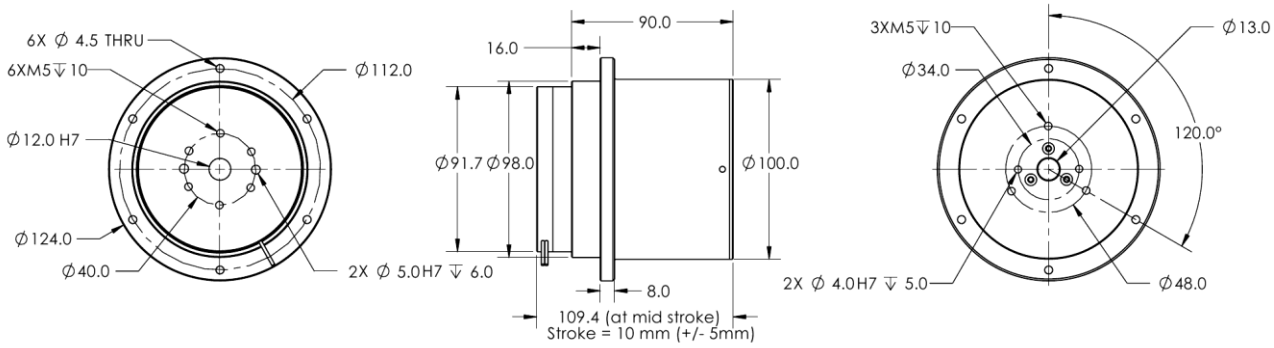

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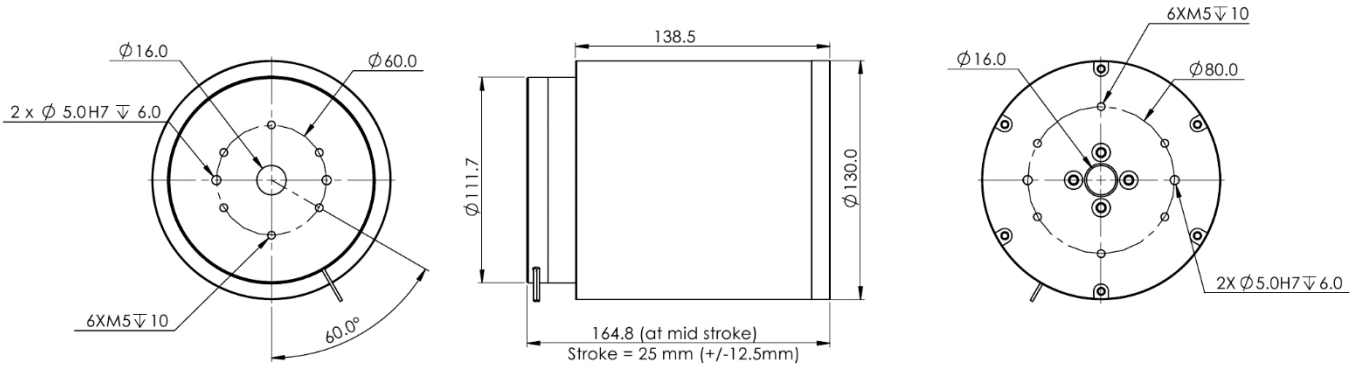
AVM 130-HF-25



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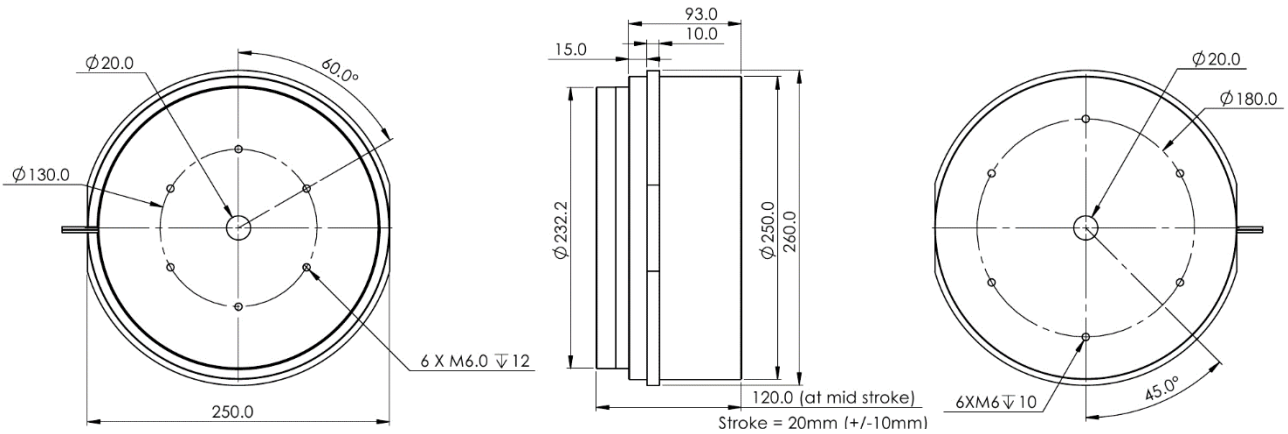

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AVM Special Models

Model	Units	AVM14-HF-4-C19	AVM14-10-C56	AVM 20-HF-6-C28
Stroke	mm	4	10	6
Force sensitivity (at mid stroke)	N/A	1.88	0.82	4.74
Back EMF constant	V/(m/s)	1.88	0.82	4.74
Continuous force (at 100 °C) ①	N	2.44	0.98	5.69
Peak force	N	7.33	2.95	17.06
Resistance ②	ohms	1.93	2.24	4.85
Inductance ②	mH	0.14	0.24	0.56
Voltage at peak force	V	7.53	8.06	17.46
Continuous current (coil at 100 °C)	A	1.30	1.20	1.20
Peak current	A	3.90	3.60	3.60
Max voltage	Vdc	60	60	60
Actuator constant	N/Sqrt(W)	1.35	0.55	2.15
Continuous power	W	3.26	3.23	6.98
Electrical time constant	ms	0.073	0.107	0.115
Mechanical time constant	ms	3.822	10.019	2.914
Clearance of coil	mm	0.35	0.35	0.50
Power at peak force	W	29.36	29.03	62.86
Thermal dissipation constant	W/°C	0.043	0.043	0.093
Max coil temperature	°C	100	100	100
Coil assembly mass	g	7.0	3.0	13.5
Core assembly mass	g	13.7	13.6	47.5

Model	Units	AVM24-HF-5-C13	AVM 30-7-C60	AVM35-HF-15-C22
Stroke	mm	5	7	15
Force sensitivity (at mid stroke)	N/A	8.40	6.20	24.70
Back EMF constant	V/(m/s)	8.40	6.20	24.70
Continuous force (at 100 °C) ①	N	5.88	5.64	19.76
Peak force	N	31.92	24.80	98.80
Resistance ②	ohms	8.24	5.50	16.60
Inductance ②	mH	1.69	1.52	7.11
Voltage at peak force	V	31.31	22.00	66.40
Continuous current (coil at 100 °C)	A	0.70	0.91	0.80
Peak current	A	3.80	4.00	4.00
Max voltage	Vdc	60	60	60
Actuator constant	N/Sqrt(W)	2.93	2.64	6.06
Continuous power	W	4.04	4.55	8.50
Electrical time constant	ms	0.205	0.276	0.428
Mechanical time constant	ms	2.511	2.189	2.196
Clearance of coil	mm	0.50	0.60	0.50
Power at peak force	W	118.99	88.00	265.60
Thermal dissipation constant	W/°C	0.054	0.061	0.113
Max coil temperature	°C	100	100	0.113
Coil assembly mass	g	21.5	15.3	80.7
Core assembly mass	g	82.0	86.2	261.0

① Continuous force measured without any additional mounting plate or heat sink on coil

② Measured at 25 °C

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Model	Units	AVM35-HF-8-C35	AVM35-HF-10-C31	AVM 40-20-C18
Stroke	mm	8	10	20
Force sensitivity (at mid stroke)	N/A	34.29	20.90	10.53
Back EMF constant	V/(m/s)	34.29	20.90	10.53
Continuous force (at 100 °C) ①	N	27.43	16.72	8.11
Peak force	N	137.16	83.60	47.39
Resistance ②	ohms	16.89	12.02	11.00
Inductance ②	mH	6.89	4.96	6.22
Voltage at peak force	V	67.56	48.08	49.50
Continuous current (coil at 100 °C)	A	0.80	0.80	0.77
Peak current	A	4.00	4.00	4.50
Max voltage	Vdc	60	60	60
Actuator constant	N/Sqrt(W)	8.34	6.03	3.17
Continuous power	W	8.65	6.15	6.52
Electrical time constant	ms	0.408	0.413	0.565
Mechanical time constant	ms	1.224	2.146	6.448
Clearance of coil	mm	0.50	0.50	0.60
Power at peak force	W	270.24	192.32	222.75
Thermal dissipation constant	W/°C	0.115	0.082	0.087
Max coil temperature	°C	100	100	100
Coil assembly mass	g	85.2	78.0	65.0
Core assembly mass	g	371.4	285.7	205.0

Model	Units	AVM 40-HF-6.4-C11-A	AVM 50-HF-10-C15-A	AVM 50-HF-10-C34-A
Stroke	mm	6.4	10	10
Force sensitivity (at mid stroke)	N/A	14.20	21.00	31.31
Back EMF constant	V/(m/s)	14.20	21.00	31.31
Continuous force (at 100 °C) ①	N	18.18	25.20	37.57
Peak force	N	99.40	105.00	156.55
Resistance ②	ohms	5.42	7.80	7.80
Inductance ②	mH	1.38	5.30	5.30
Voltage at peak force	V	37.94	39.00	39.00
Continuous current (coil at 100 °C)	A	1.28	1.20	1.20
Peak current	A	7.00	5.00	5.00
Max voltage	Vdc	60	60	60
Actuator constant	N/Sqrt(W)	6.10	7.52	11.21
Continuous power	W	8.88	11.23	11.23
Electrical time constant	ms	0.255	0.679	0.679
Mechanical time constant	ms	1.317	2.512	1.146
Clearance of coil	mm	0.50	0.60	0.60
Power at peak force	W	265.58	195.00	195.00
Thermal dissipation constant	W/°C	0.118	0.150	0.150
Max coil temperature	°C	100	100	100
Coil assembly mass	g	49.0	142.0	144.0
Core assembly mass	g	195.0	482.0	628.0

①Continuous force measured without any additional mounting plate or heat sink on coil

②Measured at 25 °C

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Model	Units	AVM 75-HF-25-C12	AVM75-38-C39	AVM 80-12-C8
Stroke	mm	25	38	12
Force sensitivity (at mid stroke)	N/A	33.70	13.72	21.40
Back EMF constant	V/(m/s)	33.70	13.72	21.40
Continuous force (at 100 °C) ①	N	124.69	45.26	33.71
Peak force	N	572.90	192.02	192.60
Resistance ②	ohms	2.72	2.35	6.36
Inductance ②	mH	2.88	1.89	1.62
Voltage at peak force	V	46.24	32.90	57.24
Continuous current (coil at 100 °C)	A	3.70	3.30	1.58
Peak current	A	17.00	14.00	9.00
Max voltage	Vdc	60	60	60
Actuator constant	N/Sqrt(W)	20.43	8.95	8.49
Continuous power	W	37.24	25.59	15.78
Electrical time constant	ms	1.059	0.804	0.255
Mechanical time constant	ms	1.700	6.671	1.722
Clearance of coil	mm	0.50	0.50	0.60
Power at peak force	W	786.08	460.60	515.16
Thermal dissipation constant	W/°C	0.496	0.341	0.210
Max coil temperature	°C	100	100	100
Coil assembly mass	g	710.0	534.0	124.0
Core assembly mass	g	1940.0	1277.0	1262.4

Model	Units	AVM 90-30-C77	AVM90-HF-5-C40-A	AVM 130-HF-10-C29-A
Stroke	mm	30	5	10
Force sensitivity (at mid stroke)	N/A	14.47	15.78	46.40
Back EMF constant	V/(m/s)	14.47	15.78	46.40
Continuous force (at 100 °C) ①	N	57.30	62.49	162.40
Peak force	N	202.60	220.92	487.20
Resistance ②	ohms	2.9	1.21	0.88
Inductance ②	mH	6.61	0.75	0.82
Voltage at peak force	V	40.60	16.94	9.24
Continuous current (coil at 100 °C)	A	4.0	3.96	3.50
Peak current	A	14.0	14.00	10.50
Max voltage	Vdc	120	120	120
Actuator constant	N/Sqrt(W)	8.50	14.35	49.46
Continuous power	W	45.48	18.97	10.78
Electrical time constant	ms	2.3	0.620	0.932
Mechanical time constant	ms	10.4	2.076	0.441
Clearance of coil	mm	0.65	0.65	0.55
Power at peak force	W	568.40	237.16	97.02
Thermal dissipation constant	W/°C	0.606	0.253	0.144
Max coil temperature	°C	100	100	100
Coil assembly mass	g	751.2	427.2	1080.0
Core assembly mass	g	1135.1	1514.6	5300.0

① Continuous force measured without any additional mounting plate or heat sink on coil

② Measured at 25 °C

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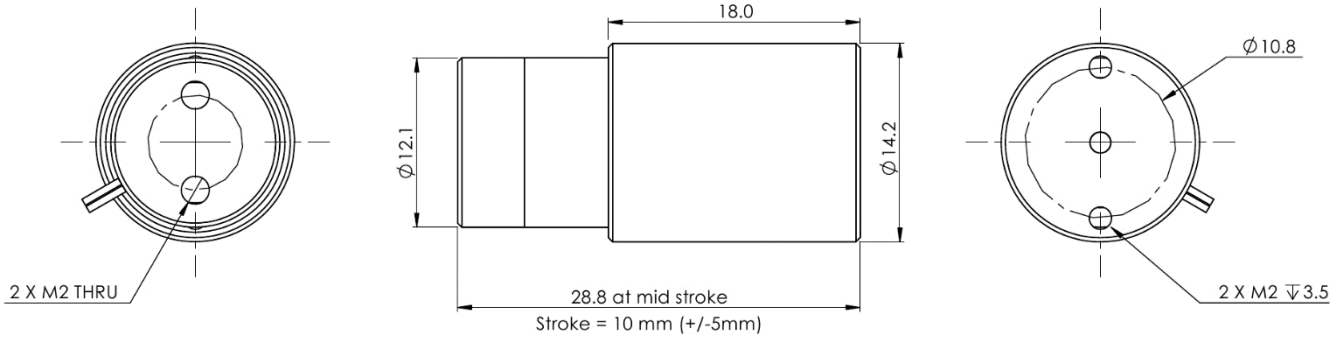
Model	Units	AVM 150-HF-20-C53
Stroke	mm	20
Force sensitivity (at mid stroke)	N/A	97.63
Back EMF constant	V/(m/s)	97.63
Continuous force (at 100 °C) ①	N	585.77
Peak force	N	1757.30
Resistance ②	ohms	4.40
Inductance ②	mH	2.60
Voltage at peak force	V	79.20
Continuous current (coil at 100 °C)	A	6.00
Peak current	A	18.00
Max voltage	Vdc	120
Actuator constant	N/Sqrt(W)	46.54
Continuous power	W	158.40
Electrical time constant	ms	0.591
Mechanical time constant	ms	0.692
Clearance of coil	mm	0.75
Power at peak force	W	1425.60
Thermal dissipation constant	W/°C	2.112
Max coil temperature	°C	100
Coil assembly mass	g	1500.0
Core assembly mass	g	12700.0

AVM 14-10-C56



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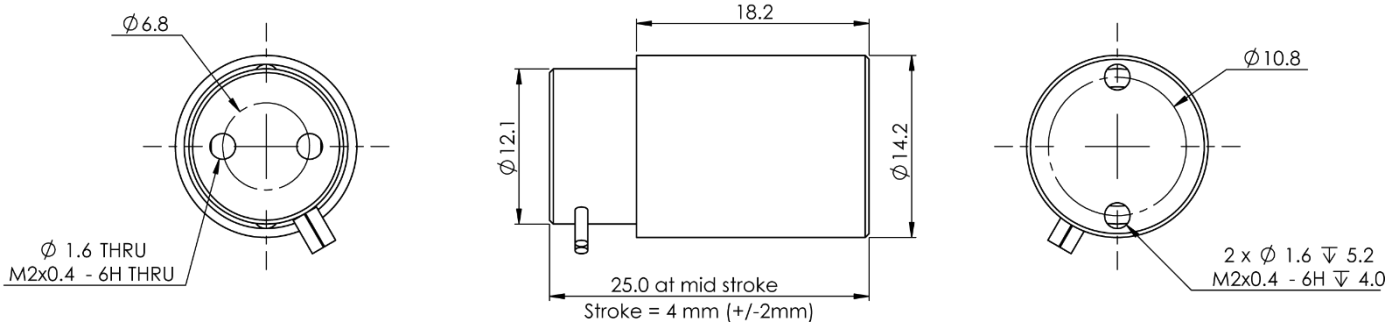
AVM 14-HF-4-C19



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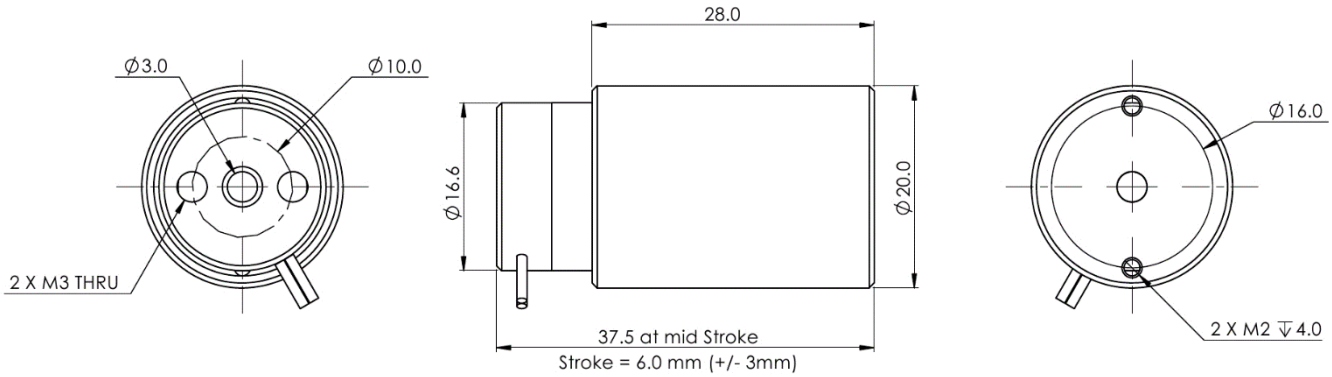

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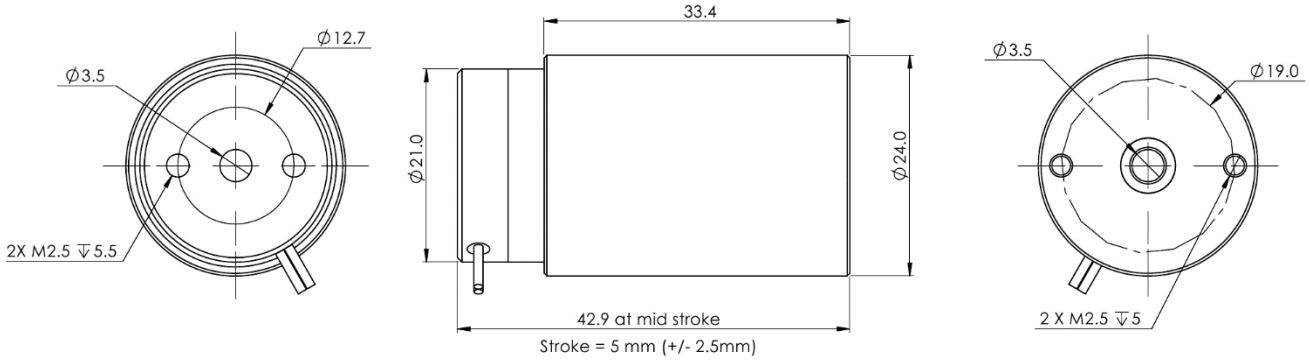

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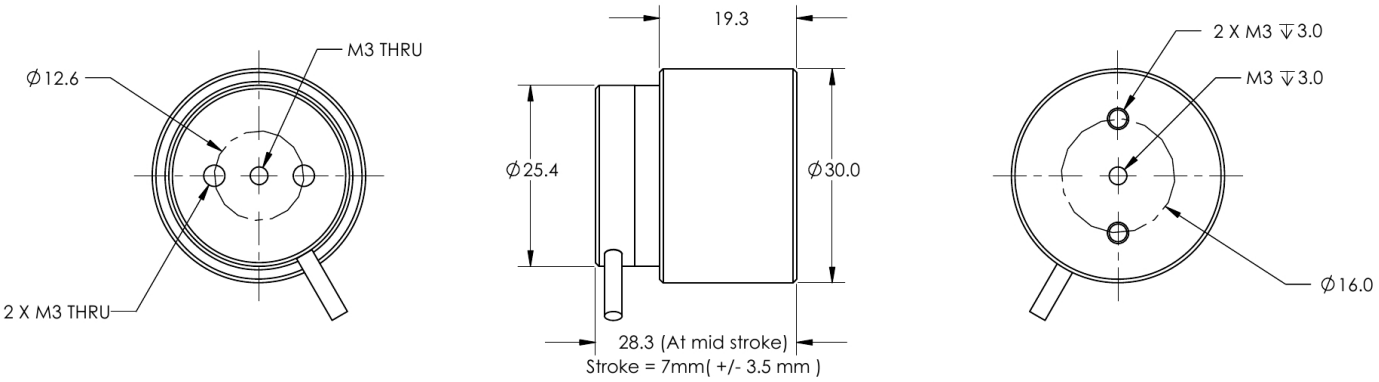
AVM 30-7-C60



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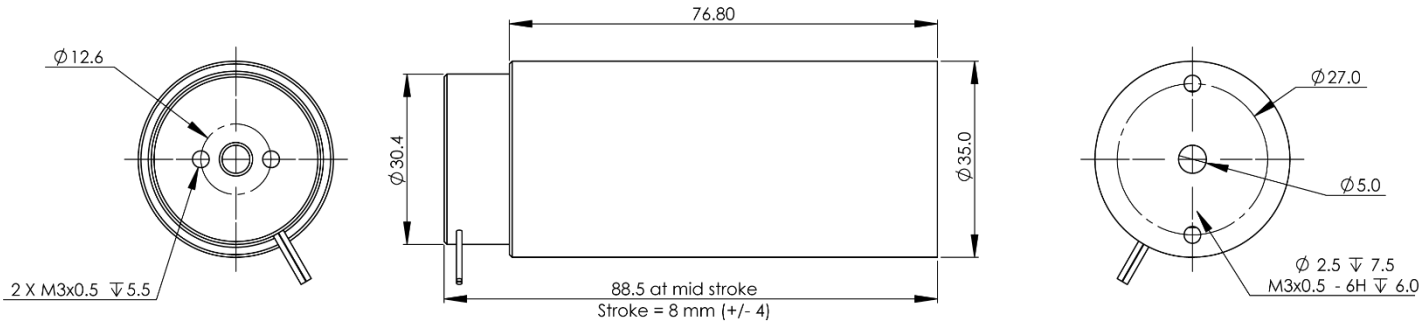

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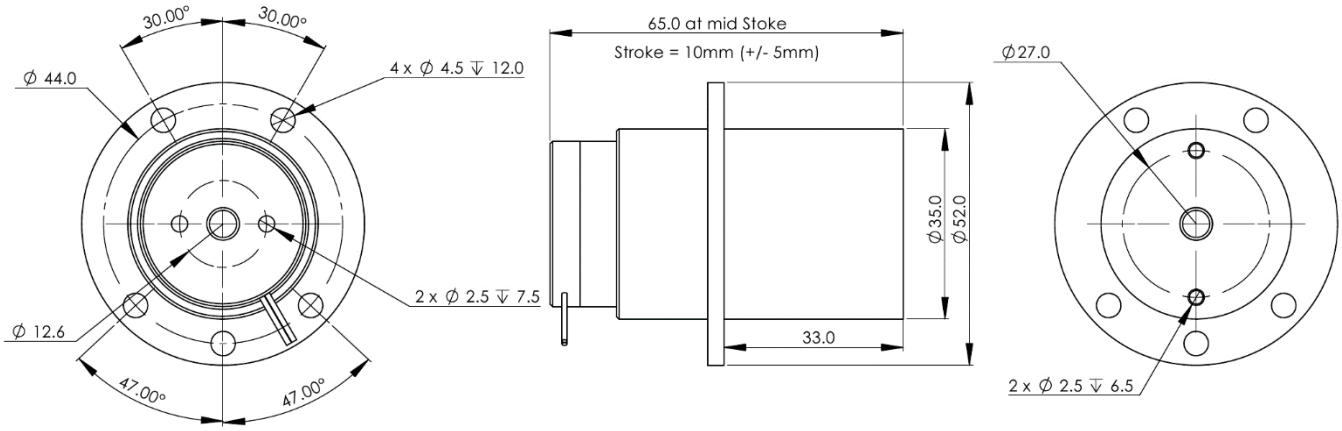

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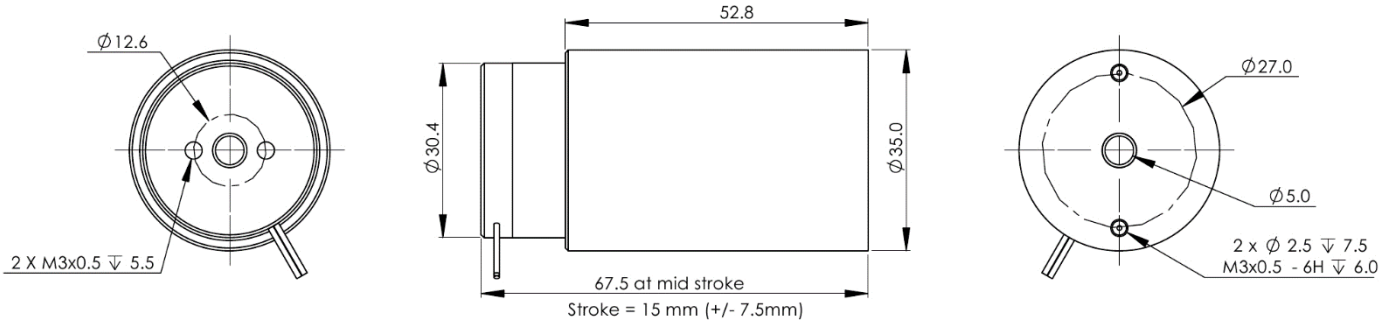
AVM 35-HF-15-C22



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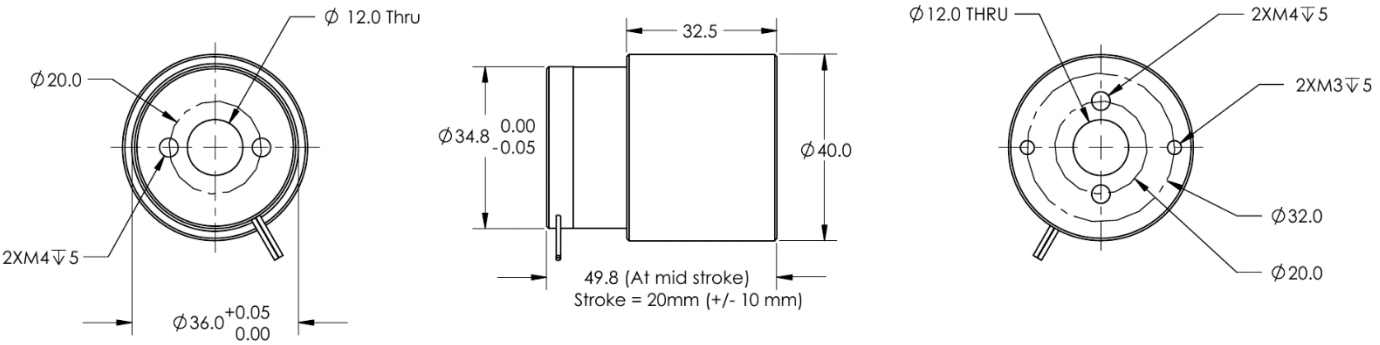
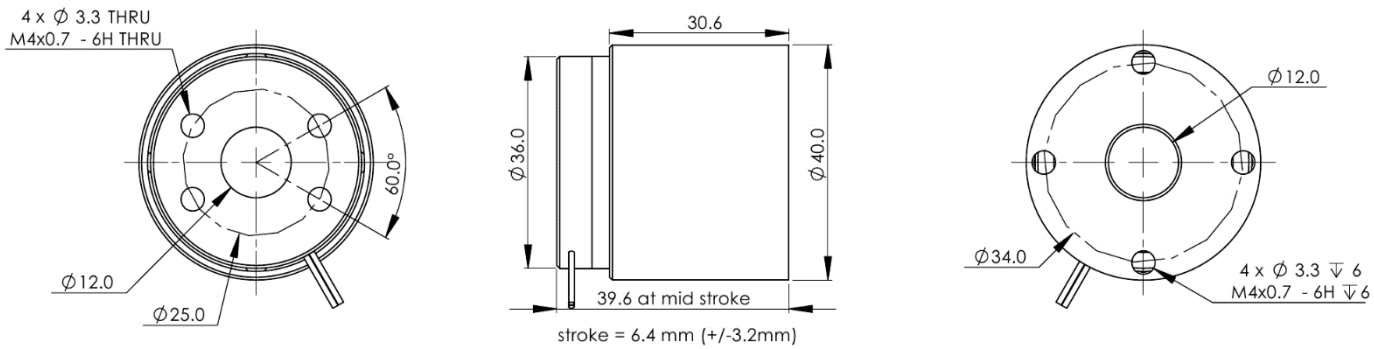


AVM 40-HF-6.4-C11-A



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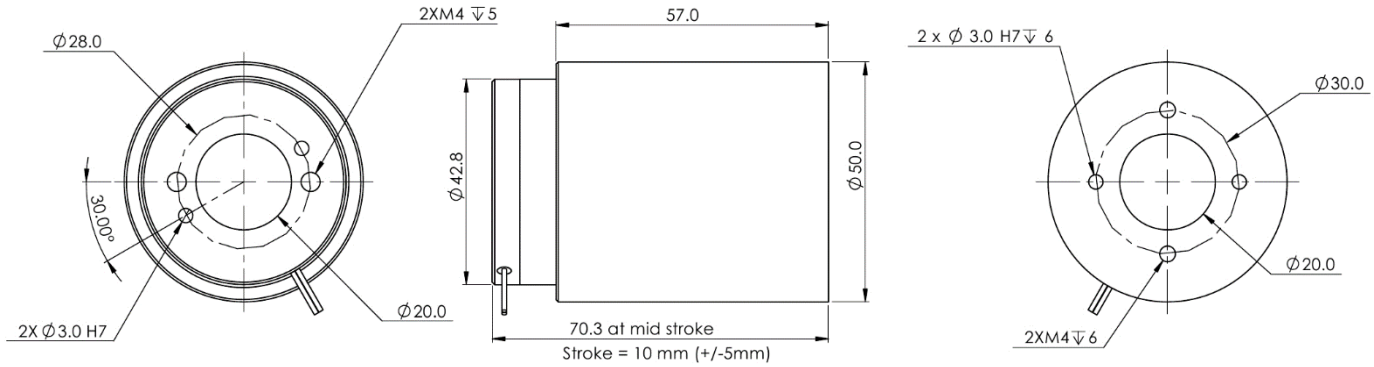
AVM 50-HF-10-C15



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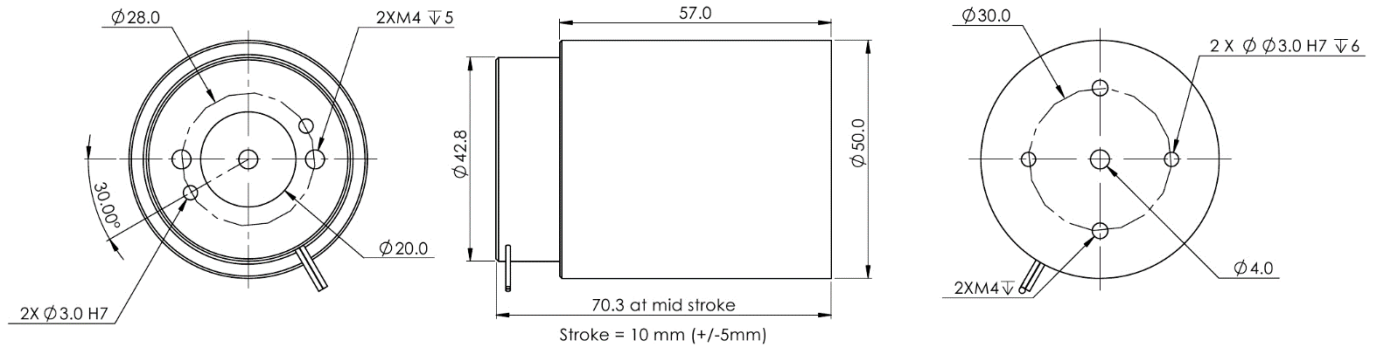
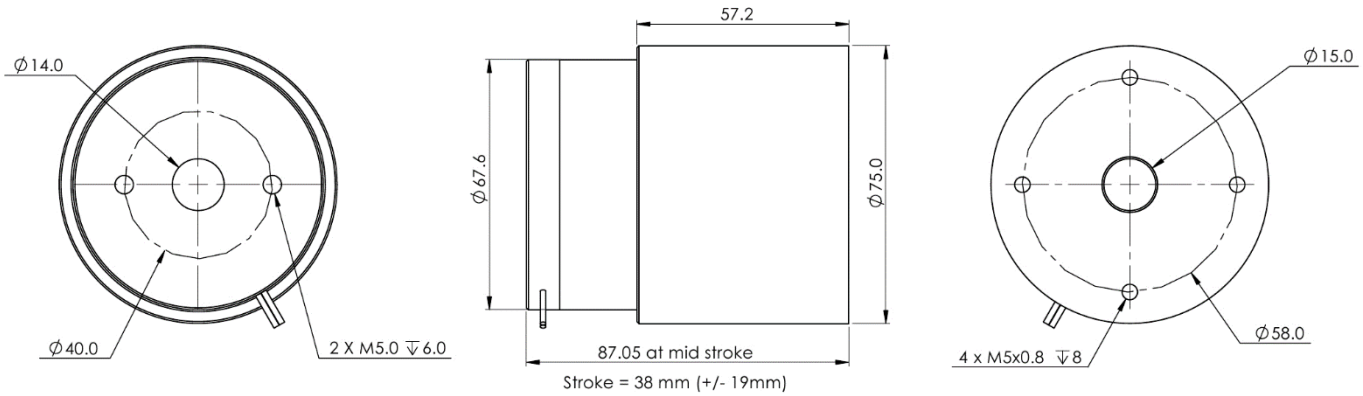


AVM 75-38-C39



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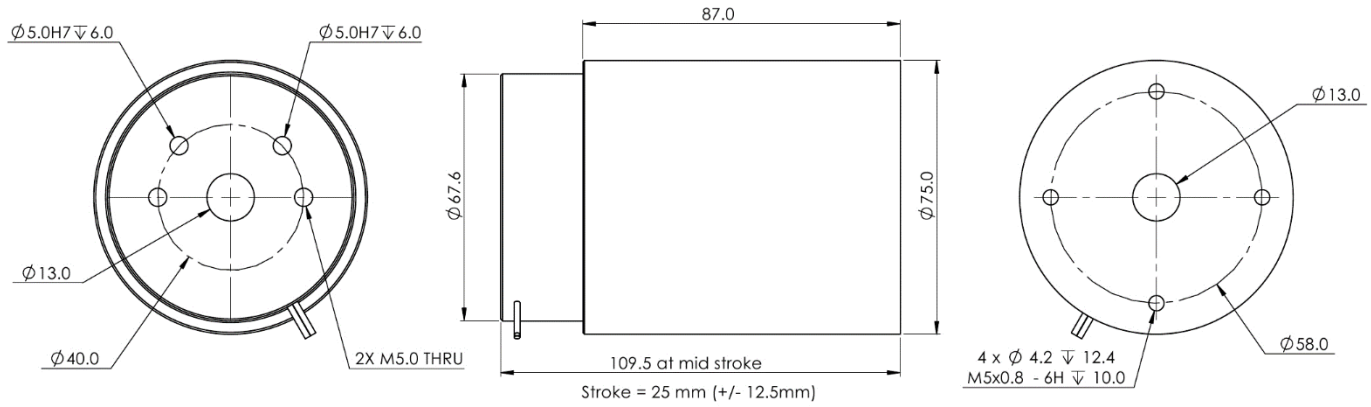
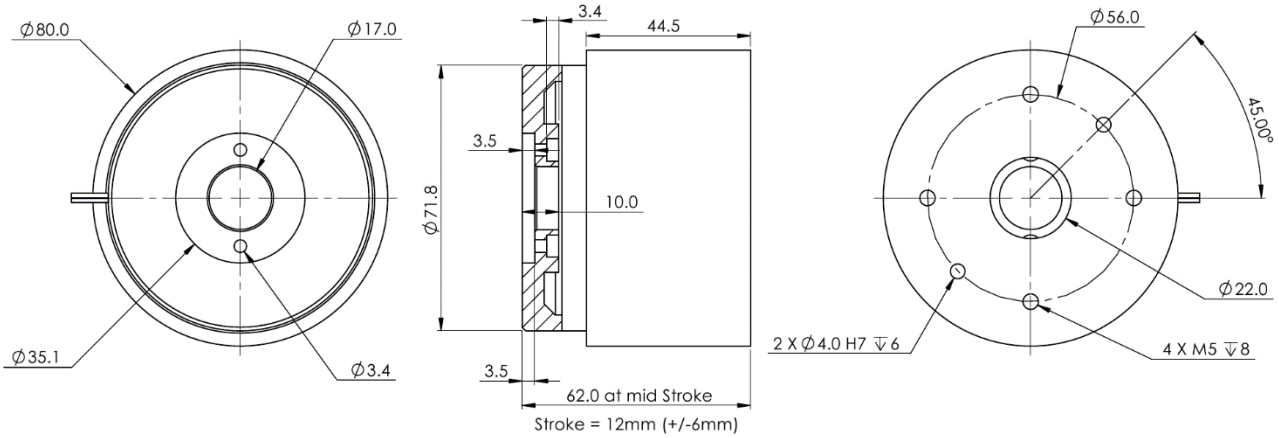
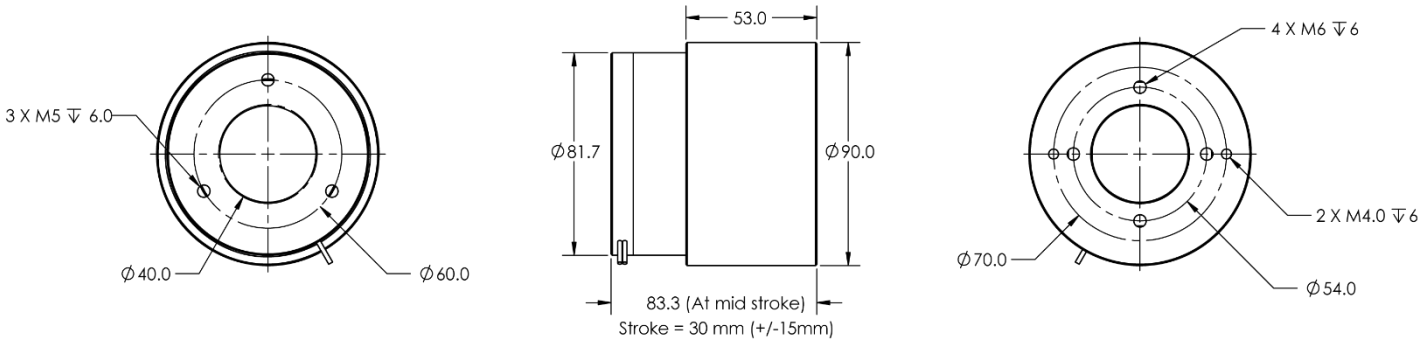
AVM 75-HF-25-C12



AVM 80-12-C8



AVM 90-30-C77



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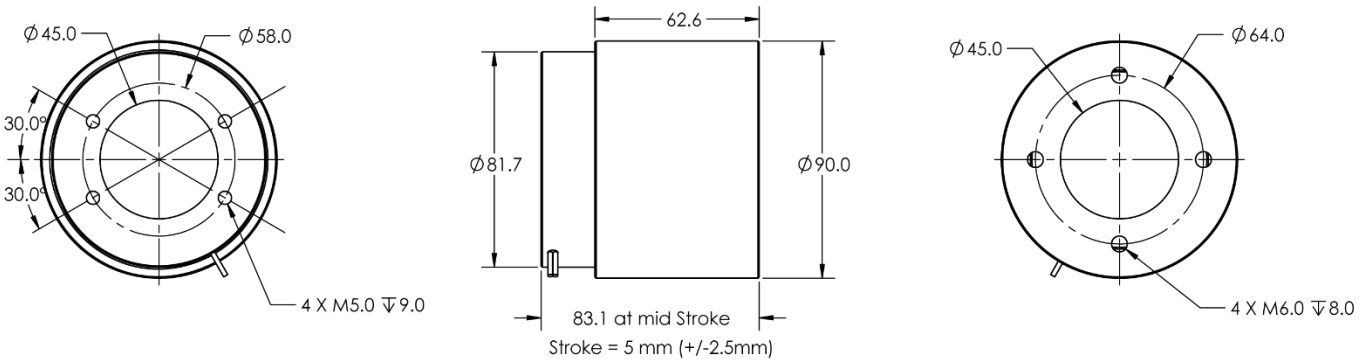
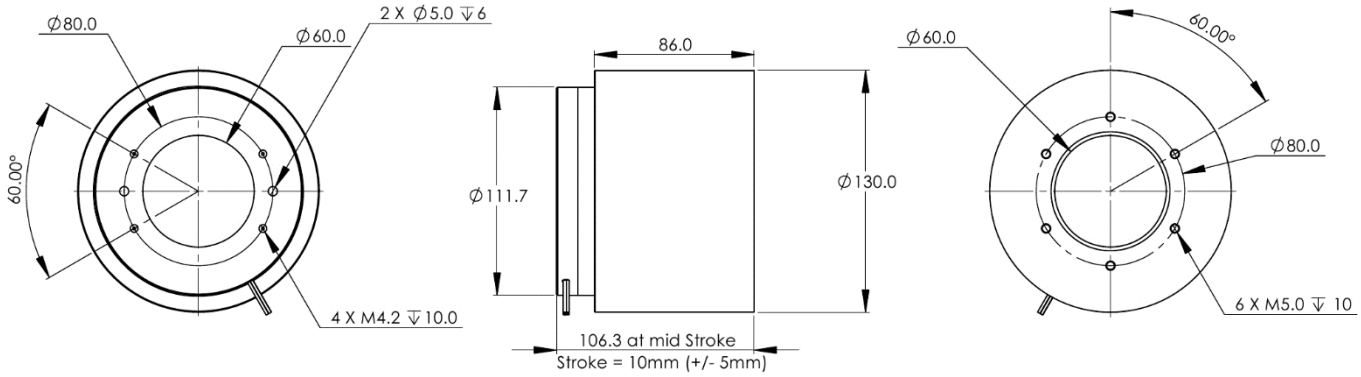
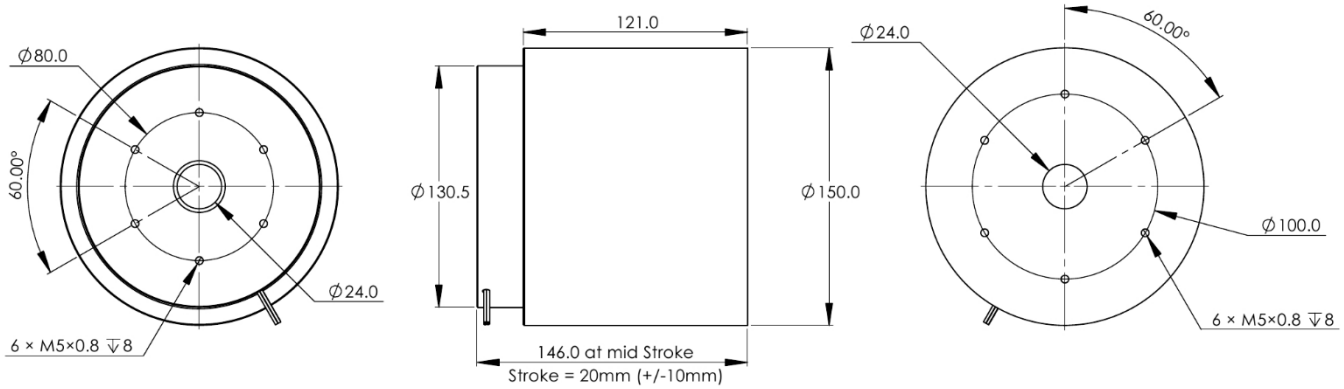
AVM 90-HF-5-C40-A



AVM 130-HF-10-C29-A



AVM 150-HF-20-C53



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Part Numbering

Standard Models	
Model & Stroke	**Cable Length (m)**
AVM 12-6.4	0.5
AVM 19-5	
AVM 20-10	
AVM 24-5	
AVM 24-10	
AVM 30-15	
AVM 40-20	
AVM 60-25	
AVM 90-30	
High Force Models	
Model & Stroke	**Cable Length (m)**
AVM 35-HF-7	0.5
AVM 40-HF-6.5	
AVM 50-HF-10	
AVM 60-HF-10	
AVM 90-HF-10	
AVM 100-HF-10	
AVM 130-HF-25	
AVM 150-HF-20	

Example: AVM 30-15-0.5

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9.2 AVA Motor

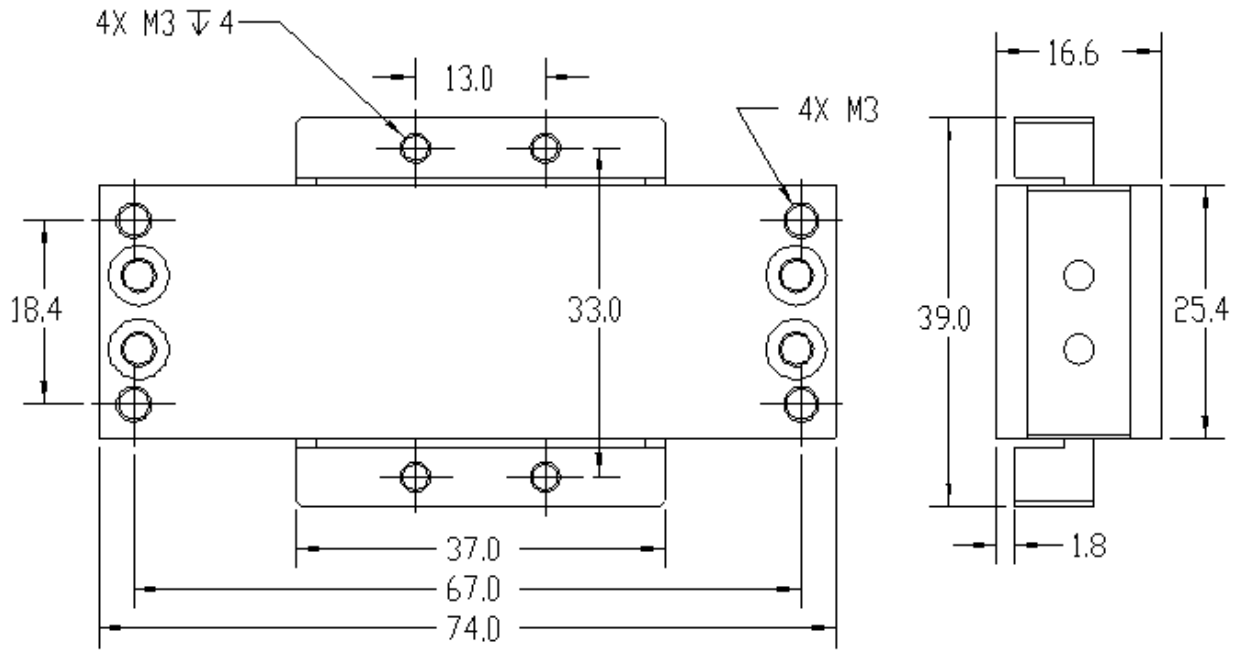
Motor Parameter

Model	Units	AVA 1-20	AVA 2-20	AVA 3-20
Stroke	mm	20	20	20
Force sensivity (at mid stroke)	N/A	1.92	8.35	9.40
Back EMF constant	V/(m/s)	1.92	8.35	9.40
Continuous force (at 100 °C)) ①	N	3.84	11.69	26.32
Peak force	N	11.5	35.1	79.0
Resistance ②	ohms	1.4	3.7	1.6
Inductance ②	mH	0.27	1.24	0.70
Voltage at peak force	V	24.0	24.0	24.0
Continuous current (coil at 100 °C)	A	2.00	1.40	2.80
Peak current	A	6.0	4.2	8.4
Max voltage	Vdc	60	60	60
Actuator constant	N/Sqrt(W)	1.61	4.37	7.43
Continuous power (at 100 °C)	W	5.68	7.15	12.54
Electrical time constant	ms	0.2	0.3	0.4
Mechanical time constant	ms	6.5	2.4	1.3
Clearance of coil	mm	0.60	0.60	0.60
Power at peak force	W	51.1	64.4	112.9
Thermal dissipation constant	W/°C	0.076	0.095	0.167
Max coil temperature	°C	155.0	155.0	155.0
Coil assembly mass	g	17.0	45.0	72.0
Total assembly mass	g	186.0	496.0	930.0

① Continuous force measured without any additional mounting plate or heat sink on coil

② Measured at 25 °C

AVA 1



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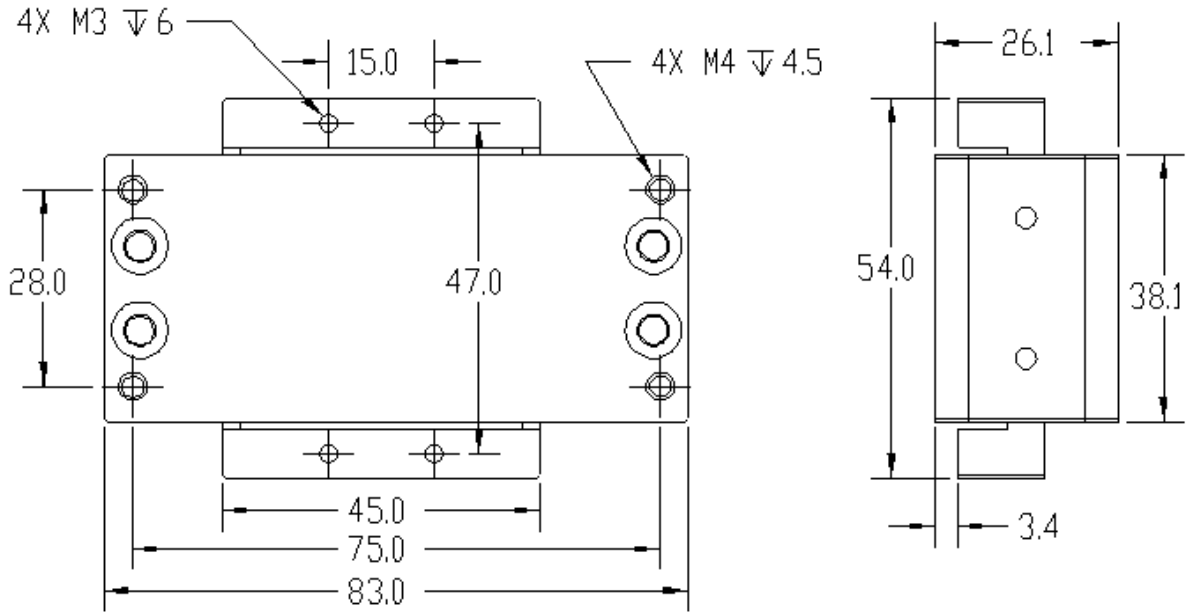
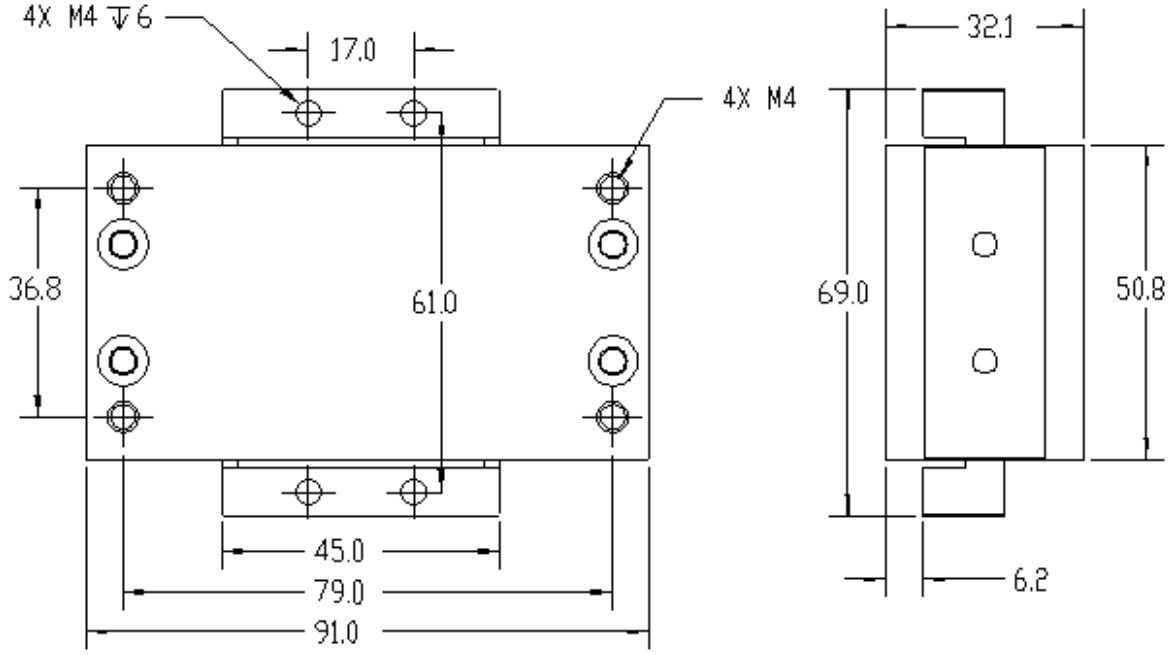
AVA 2



AVA 3



Part Numbering

Standard Models	
Model & Stroke	**Cable Length (m)**
AVA1-20	0.5
AVA2-20	
AVA3-20	

Example: AVM 30-15-0.5

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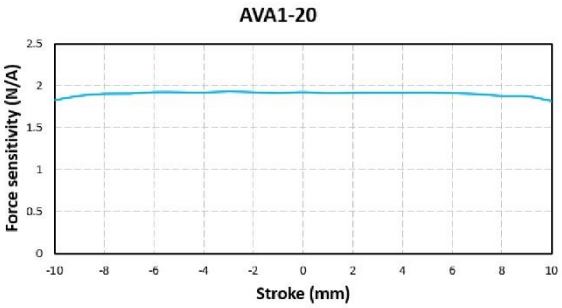
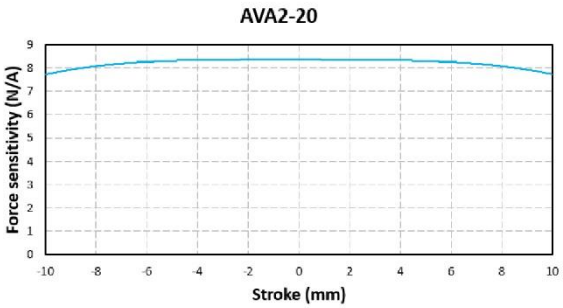
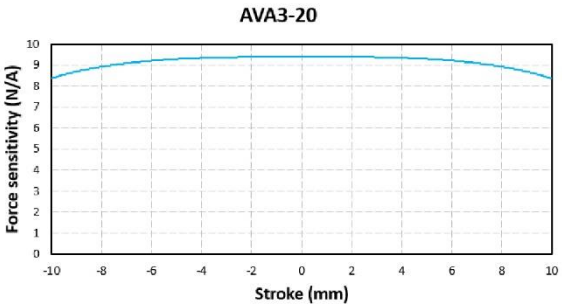
Force constant curve







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9.3 MGV Module

Motor Parameter

MGV	Unit	MGV 38	MGV 41	MGV 52	MGV 84
Electrical Parameters	**Driven by Voice Coil**	**AVM30-15**	**AVM40-20**	**AVM60-25**	**AVM90-30**
Continuous ForceCoil @100ºC	N	4.6	9.9	26.4	74.3
Peak Force	N	29.4	58.1	119.0	315.0
Motor Constant	N/SqRt (W)	2.26	3.89	7.45	13.21
Continuous Power	W	4.2	6.5	12.5	31.6
Peak Power	W	169.6	222.8	254.8	568.4
Max Bus Voltage	V	48	60	60	60
Max Coil Temperature	ºC	155	155	155	155
Continuous current	A	0.63	0.77	1.55	3.30
Peak Current, I_{peak}	A	4.00	4.50	7.00	14.00
Force Constant	N/A	7.35	12.90	17.00	22.50
Back EMF Constant, V_{emf}	V/m/s	7.35	12.90	17.00	22.50
Inductance	mH	2.94	6.22	6.42	6.61
Terminal Resistance @ 25ºC	Ohms	10.6	11	5.2	2.9
Electrical Time Constant	ms	0.3	0.6	1.2	2.3
Mechanical Parameters					
Moving Mass	kg	0.084	0.162	0.391	1.386
Total Mass	kg	0.366	0.715	1.703	5.457
Recommended maximum load	kg	0.3	0.8	2.0	6.0
Stroke *	mm	15	20	25	30
Note: Please contact us for customized stroke.					
Performance Parameters					
Straightness	µm	±3µm/25mm			
Flatness	µm	±3µm/25mm			
Bidirectional Repeatability	µm	±1.5µm			
Linearity without mapping	µm	±3µm/25mm			
Linearity with mapping	µm	±0.5µm/25mm			
Note: The straightness, bidirectional repeatability and linearity are qualified according to ISO 230-2:1997.					
ISO 230-2: 1997 - Bidirectional Repeatability, Bidirectional Accuracy, Bidirectional positional deviation					
Bearing Parameters					
Maximum static load capacity	N	129.0	231.0	706.0	1710.0
Maximum static roll moment	Nm	5.0	10.6	23.1	176.0
Maximum static pitch moment	Nm	3.1	7.8	12.0	51.2
Maximum static yaw moment	Nm	3.7	9.0	12.0	51.2
Recommended maximum load[1]	N	2.9	7.8	19.6	58.9
Recommended roll moment	Nm	1.7	3.5	7.7	58.7
Recommended pitch moment	Nm	1.0	2.6	4.0	17.1
Recommended yaw moment	Nm	1.2	3.0	4.0	17.1
1: The recommended maximum load is based on the load in which the acceleration of the moving mass is at least 1G.					

* Stroke refers to hardstop-to-hardstop. The limit sensors are positioned 0.5mm from the hardstops.

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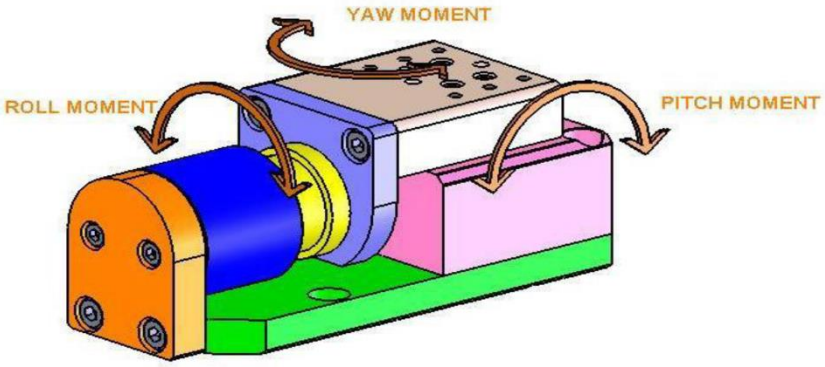
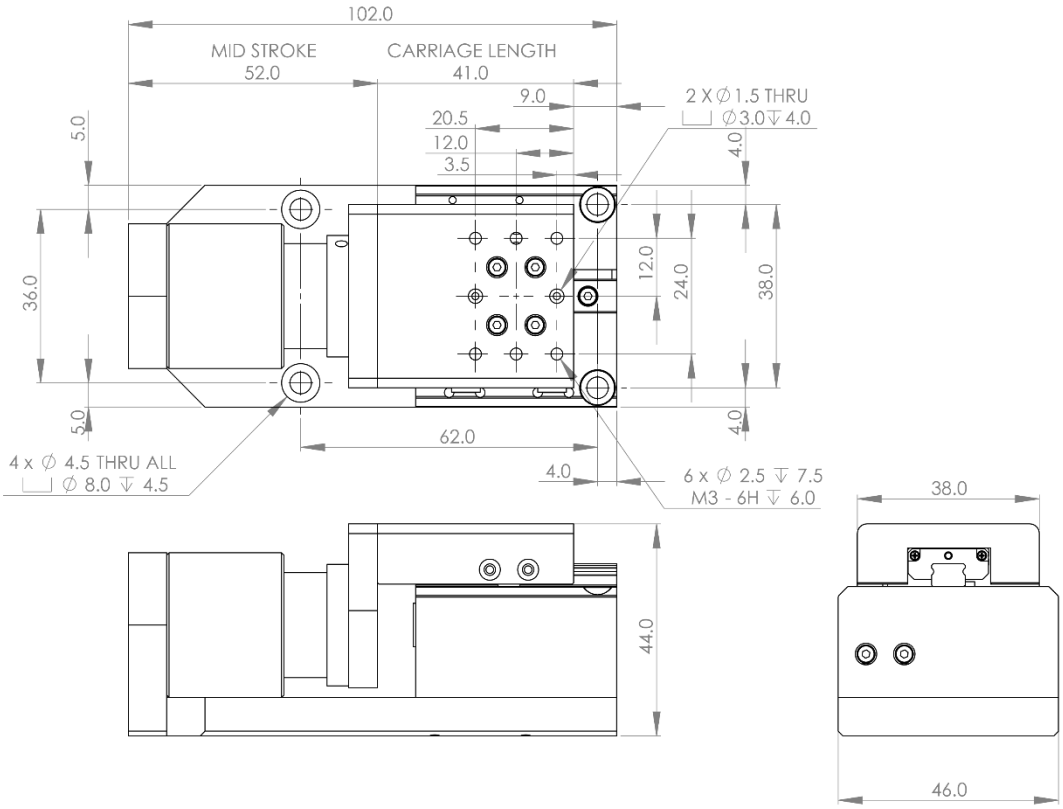


MGV 38



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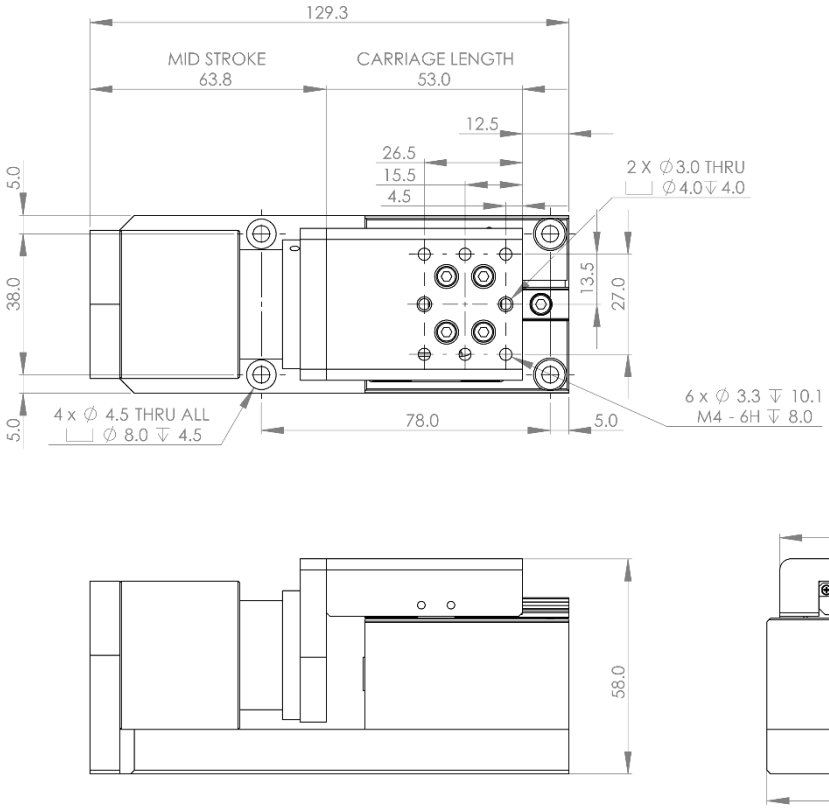
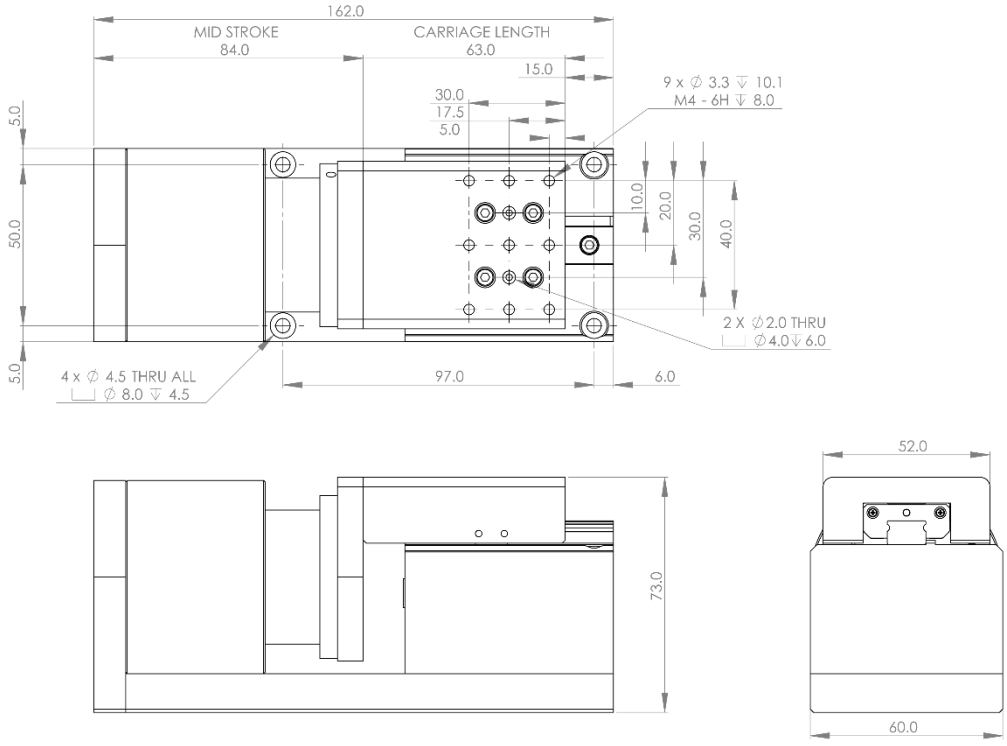
MGV 41



MGV 52



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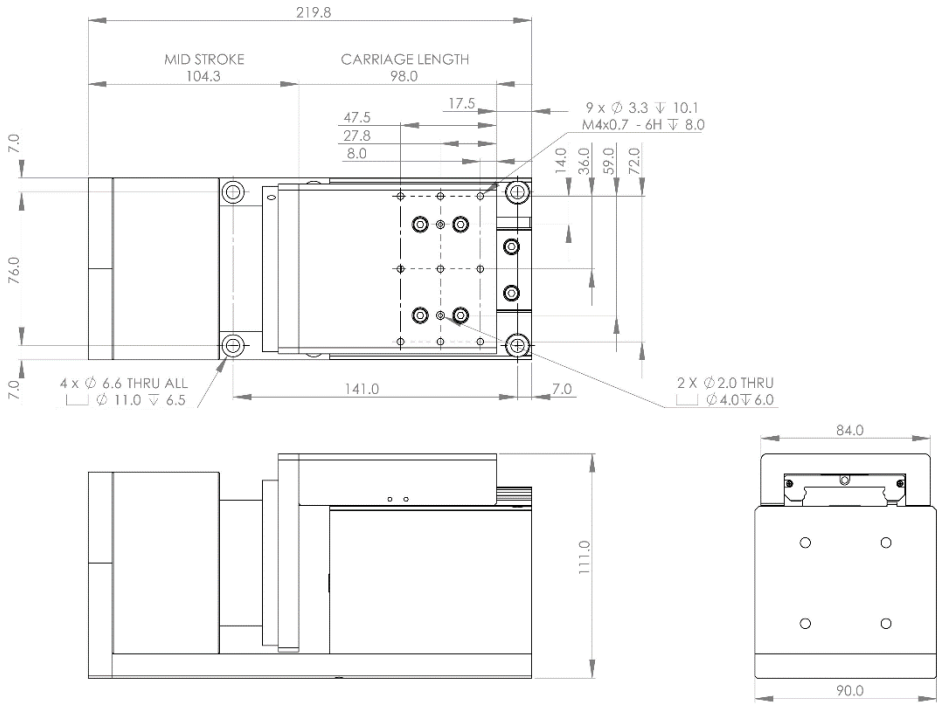
MGV 84



Part Numbering

Common Definition :

* L0100 = 100g Payload
* L0200 = 200g Payload
* L0500 = 500g Payload
* L1000 = 1000g Payload
* E00 = Counter-balance Device activated and Resting Position at 0mm
* E15 = Counter-balance Device activated and Resting Position at 15mm
* E20 = Counter-balance Device activated and Resting Position at 20mm
* E25 = Counter-balance Device activated and Resting Position at 25mm
* E50 = Counter-balance Device activated and Resting Position at 50mm

Horizontal Application：

MGV Series			
Model	**Coil Type**	**Encoder**	**Resolution (um)**
MGV 38	AVM30-15-0.5	M1	1500-1.0
MGV 41	AVM40-20-0.5		1500-0.5
MGV 52	AVM60-25-0.5		2000-0.1
MGV 84	AVM90-30-0.5		

Module

Example: MGV84-AVM90-30-0.5-M1-1500-0.5

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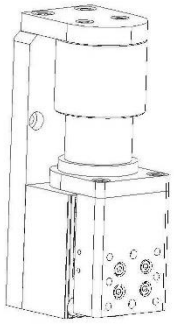
Vertical Application：



*Orientation of vertical application.
Pls contact factory for the other orientation.

1 **MGV 38**

Model	Coil Type	Encoder	Resolution (um)	Customer Payload *	Position At Rest *
MGV 38	AVM30–15–0.5	[1]M1	1500-1.0	L0000 to L0100	E00 to E15
			1500-0.5		
			2000-0.1		

Module

Example: MGV38-AVM30-15-0.5-M1-1500-0.5-L0100-E15

2 **MGV 41**

Model	Coil Type	Encoder	Resolution (um)	Customer Payload *	Position At Rest *
MGV 41	AVM40-20-0.5	[1]M1	1500-1.0	L0000 to L0200	E00 to E20
			1500-0.5		
			2000-0.1		

Module

Example: MGV84-AVM40-20-0.5-M1-1500-0.5-L0200-E15

3 **MGV 52**

Model	Coil Type	Encoder	Resolution (um)	Customer Payload *	Position At Rest *
MGV 52	AVM60-25-0.5	[1]M1	1500-1.0	L0000 to L0500	E00 to E25
			1500-0.5		
			2000-0.1		

Module

Example: MGV84-AVM60-25-0.5-M1-1500-0.5-L0500-E20

4 **MGV 84**

Model	Coil Type	Encoder	Resolution (um)	Customer Payload *	Position At Rest *
MGV 84	AVM90-30-0.5	[1]M1	1500-1.0	L0000 to L1000	E00 to E30
			1500-0.5		
			2000-0.1		

Module

Example: MGV84-AVM90-30-0.5-M1-1500-0.5-L1000-E15

1. With external Micro Photo sensor (Panasonic PM series)

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9.4 XRV Module

Motor Parameter

XRV	Unit	XRV76	XRV97	XRV115
Electrical Parameters	**Motor**	**AVA1-20**	**AVA2-20**	**AVA3-20**
Continuous Force Coil @100ºC	N	2.74	10.08	17.92
Peak Force	N	8.20	30.20	53.80
Motor Constant	N/SqRt (W)	1.16	3.90	5.23
Continuous Power	W	5.6	6.66	11.76
Peak Power	W	50.4	60	105.8
Max Bus Voltage	V	24	24	24
Max Coil Temperature	ºC	155	155	155
Continuous current	A	2	1.4	2.8
Peak Current, I_{peak}	A	6	4.2	8.4
Force Constant	N/A	1.37	7.20	6.40
Back EMF Constant, V_{emf}	V/m/s	1.37	7.20	6.40
Inductance	mH	0.26	1.6	0.68
Terminal Resistance @ 25ºC	Ohms	1.4	3.4	1.5
Electrical Time Constant	ms	0.2	0.5	0.5
Mechanical Parameters				
Moving Mass	kg	0.167	0.264	0.425
Total Mass	kg	0.476	1.152	2.206
Recommended maximum load	kg	0.1	0.7	1.4
Stroke *	mm	20	20	20
Note: Please contact us for customized stroke.				
Performance Parameters				
Straightness	µm	±2.5µm		
Flatness	µm	±2.5µm		
Bidirectional Repeatability	µm	±0.5µm		
Linearity without mapping	µm	±5µm		
Linearity with mapping	µm	±1µm		
Note: The straightness, bidirectional repeatability and linearity are qualified according to ISO 230-2:1997.				

* Stroke refers to hardstop-to-hardstop. The limit sensors are positioned 0.5mm from the hardstops.

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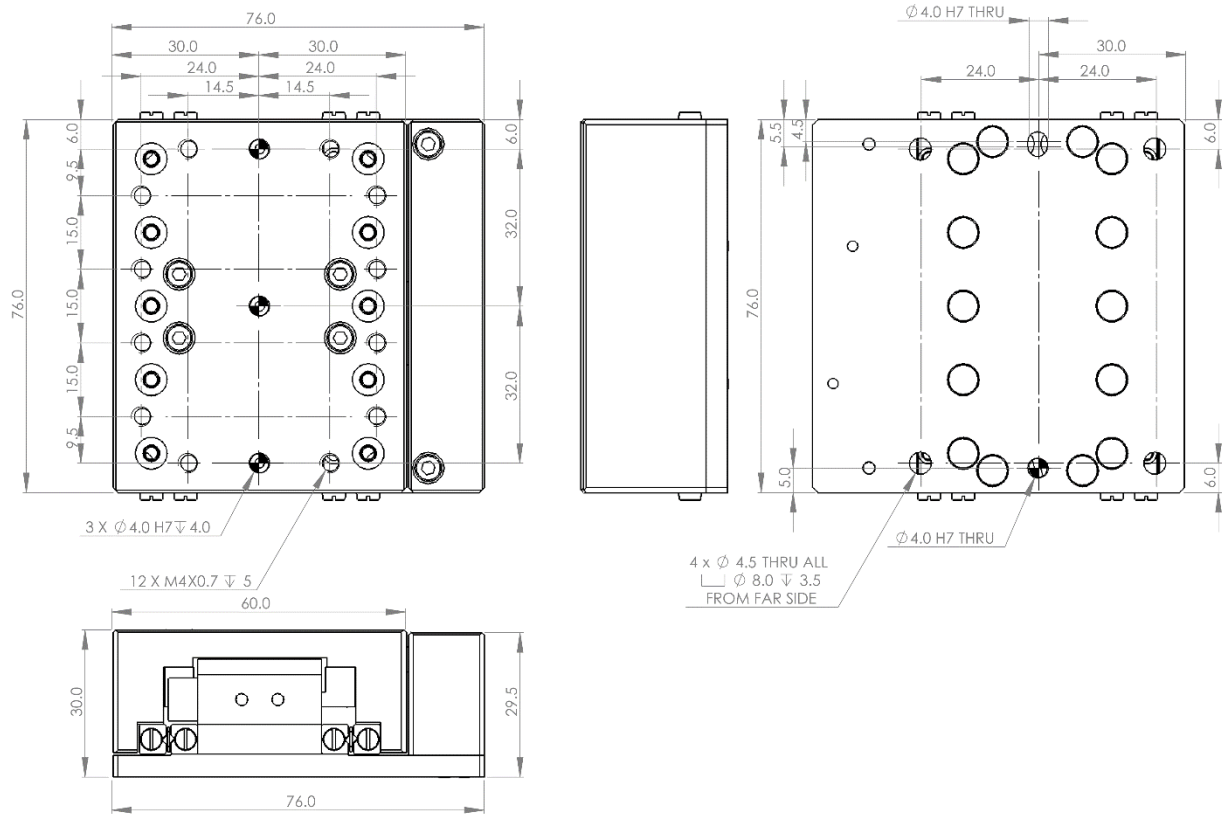
XRV 76-AVA1-20-0.5



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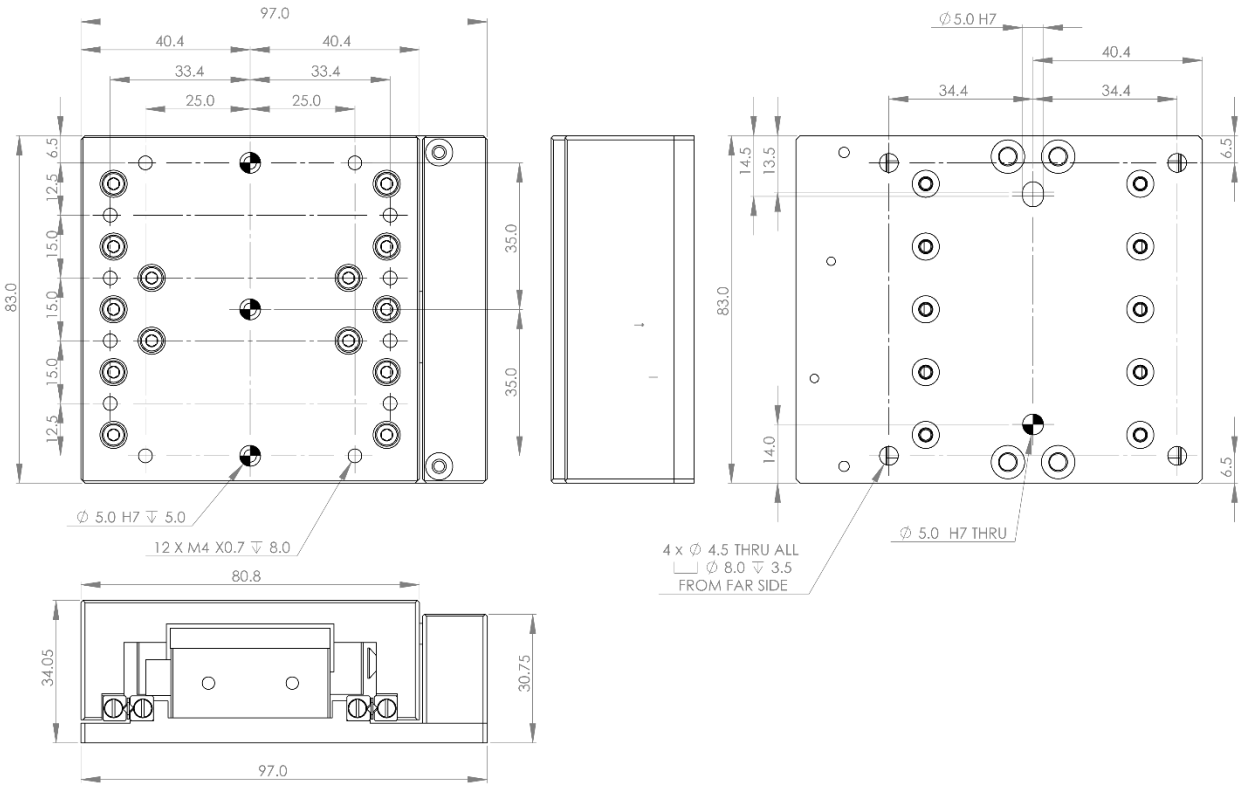

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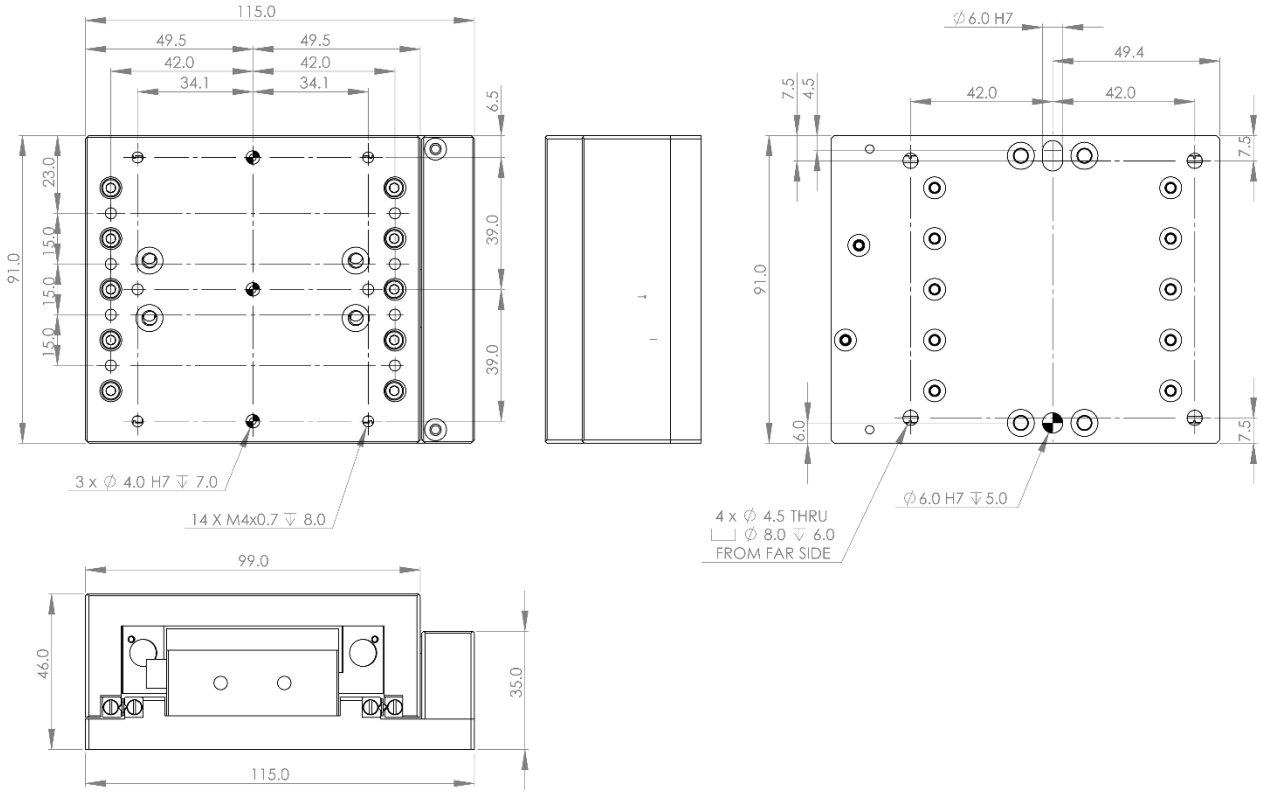
XRV 115-AVA3-20-0.5



Part Numbering

Horizontal Application：

XRV Series			
Model	**Coil Type Options**	**Encoder Options**	**Encoder Resolution (um) Options**
XRV76	AVA1-20-0.5	[1]M1	1500-1.0 / 1500-0.5 / 2000-0.1 / 3000-0.02 / 3500-0.005
XRV97	AVA2-20-0.5		
XRV115	AVA3-20-0.5		

1. With external Micro Photo sensor (Panasonic PM series)

Module

Example: XRV76-AVA1-20-0.5-M1-1500-0.5

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9.5 DGV Module

Motor Parameter

DGV		DGV 16	DGV 26	DGV32
	Unit	1µm	1µm	1µm
Electrical Parameters	**Motor**	**AVA 1-C2-10**	**AVA 2-20**	**AVA 3-20**
Continuous ForceCoil @100ºC	N	4	10.08	17.92
Peak Force	N	12	30.2	53.8
Continuous current	A	2	1.4	2.8
Peak Current	A	6	4.2	8.4
Voltage at Peak Force	V	4.9	24	24
Force Sensitivity	N/A	2.3	7.2	6.4
Back EMF Constant	V/m/s	2.3	7.2	6.4
Resistance	Ohms	1	3.4	1.5
Inductance	mH	0.134	1.6	0.68
Actuator constant	N/SqRt(W)	2.3	3.9	5.23
Max Allowable Coil Temp	Deg C	155	155	155
Mechanical Parameters				
Moving Mass	kg	0.028	0.110	0.160
Total Mass	kg	0.220	0.750	1.100
Recommended maximum load	kg	0.175713598	0.403761468	0.753353721
Stroke *	mm	10 #	20	20
Note: Please contact us for customized stroke.				
Performance Parameters				
Straightness	µm	±3µm		
Flatness	µm	±3µm		
Bidirectional Repeatability (1µm resolution)	µm	±2µm		
Note: The straightness, bidirectional repeatability and linearity are qualified according to ISO 230-2:1997.				
Bearing Parameters				
Maximum static load capacity	N	176.0	236.0	548.0
Maximum static roll moment	Nm	3.8	4.2	16.5
Maximum static pitch moment	Nm	1.0	1.8	4.9
Maximum static yaw moment	Nm	3.8	4.2	16.5
Recommended maximum load[1]	N	1.7	4.0	7.4
Recommended roll moment	Nm	1.3	1.4	5.5
Recommended pitch moment	Nm	0.3	0.6	1.6
Recommended yaw moment	Nm	1.3	1.4	5.5
1: The recommended maximum load is based on the load in which the acceleration of the moving mass is at least 1G.				

* Stroke refers to hardstop-to-hardstop. The limit sensors are positioned 0.5mm from the hardstops.

DGV16 is too compact to integrate with the limit sensor. Hence, this DGV16 module is without limit sensor.

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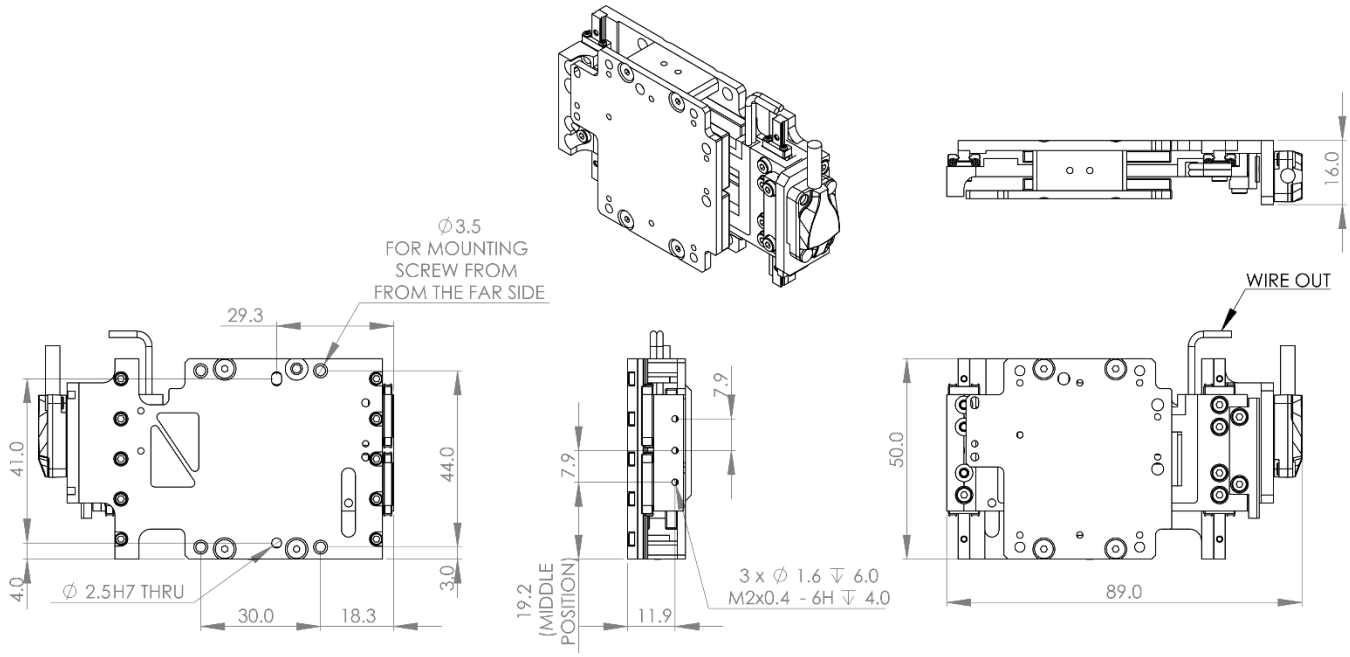
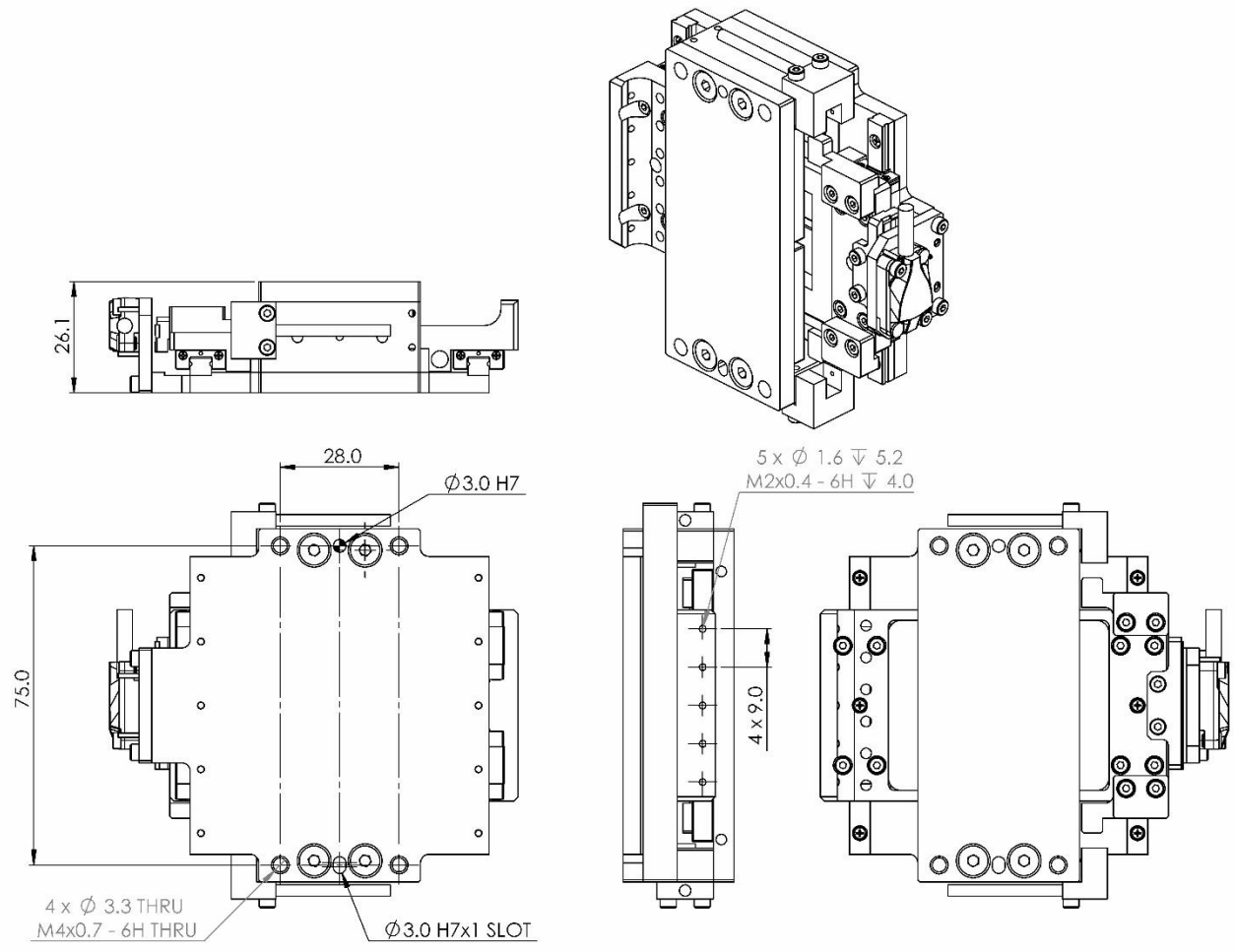
DGV 16



DGV 26-20



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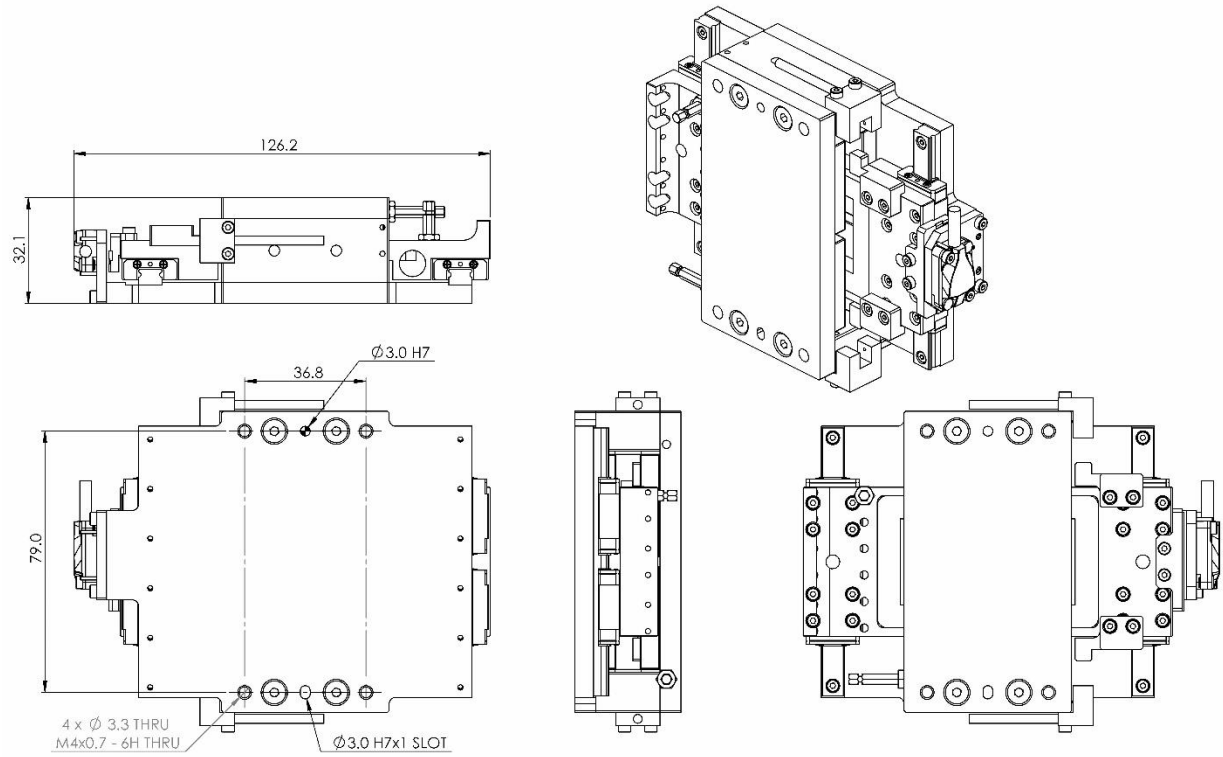
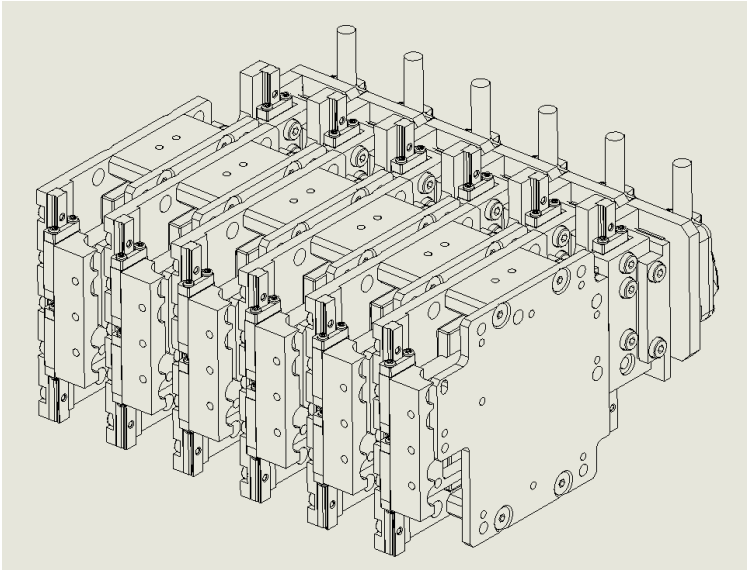
DGV 32-20



Multiple pick and place solution



Part Numbering

Model	Stroke	Coil Type Options	Cable Length	Encoder Options	Encoder Resolution (um)
DGV16	10	AVA1-C2-10	0.5	M1	1500-1.0 / 1500-0.5
DGV26	20	AVA2-20	DGV26		
DGV32	20	AVA3-20	DGV32		

Example: DGV16-AVA1-C2-10-0.5 – M1-1500-0.5

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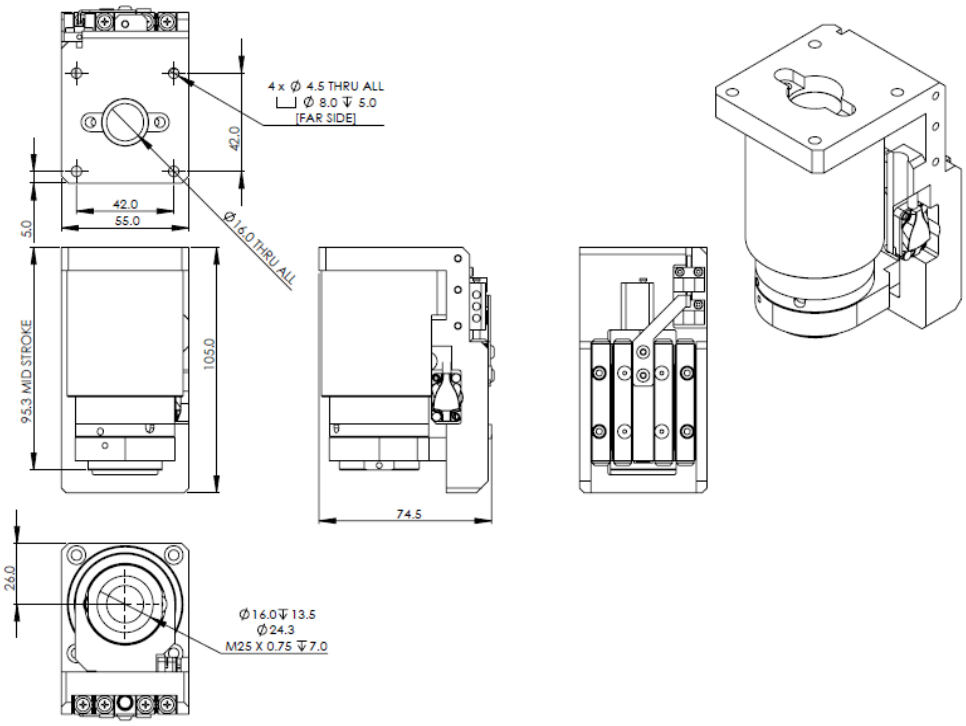
9.6 TGV Module

TGV Series Specifications

TGV	Model	TGV50	TGV90	TGV130
Performance Parameter	**Unit**	**AVM50-HF-10-C15**	**AVM90-HF-5-C40**	**AVM130-HF-10-C29**
Stroke *	mm	10	5	10
Force Sensitivity	N/A	21	15.78	46.4
Back EMF Constant	V/m/s	21	15.78	46.4
Continuous Force, coil @100°C	N	25.2	62.49	162.4
Peak Force	N	105	220.9	482.6
Resistance	Ohms	7.8	2.9	2.4
Inductance	mH	4.4	0.76	0.82
Voltage at peak force	V	39	40.6	25
Continuous current @ 100°C	A	1.2	4	3.5
Peak Current	A	5	14	10.4
Actuator Constant	N/SqRt(W)	7.52	9.27	29.95
Continuous Power @ 100°C	W	11.23	46.4	29.4
Electrical time constant	ms	0.6	0.26	0.34
Mechanical time constant	ms	2.5	5.31	1.2
Clearance of coil	mm	0.6	0.65	0.55
Power at peak force	W	195	568.4	259.6
Thermal dissipation constant	W/°C	0.151	0.619	0.392
Max coil temperature	°C	155	155	155
Coil assembly mass	g	140	456	1080
Core assembly mass	g	576	1449	5300

* Stroke refers to hardstop-to-hardstop. The limit sensors are positioned 0.5mm from the hardstops.

TGV 50



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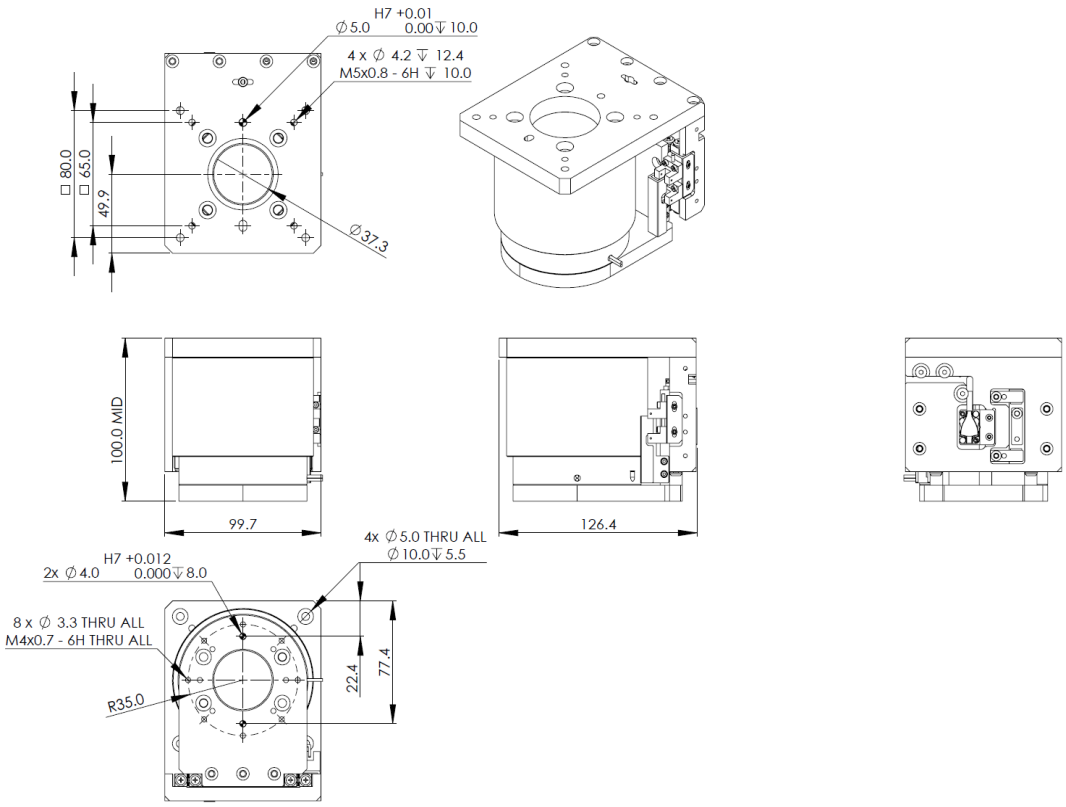
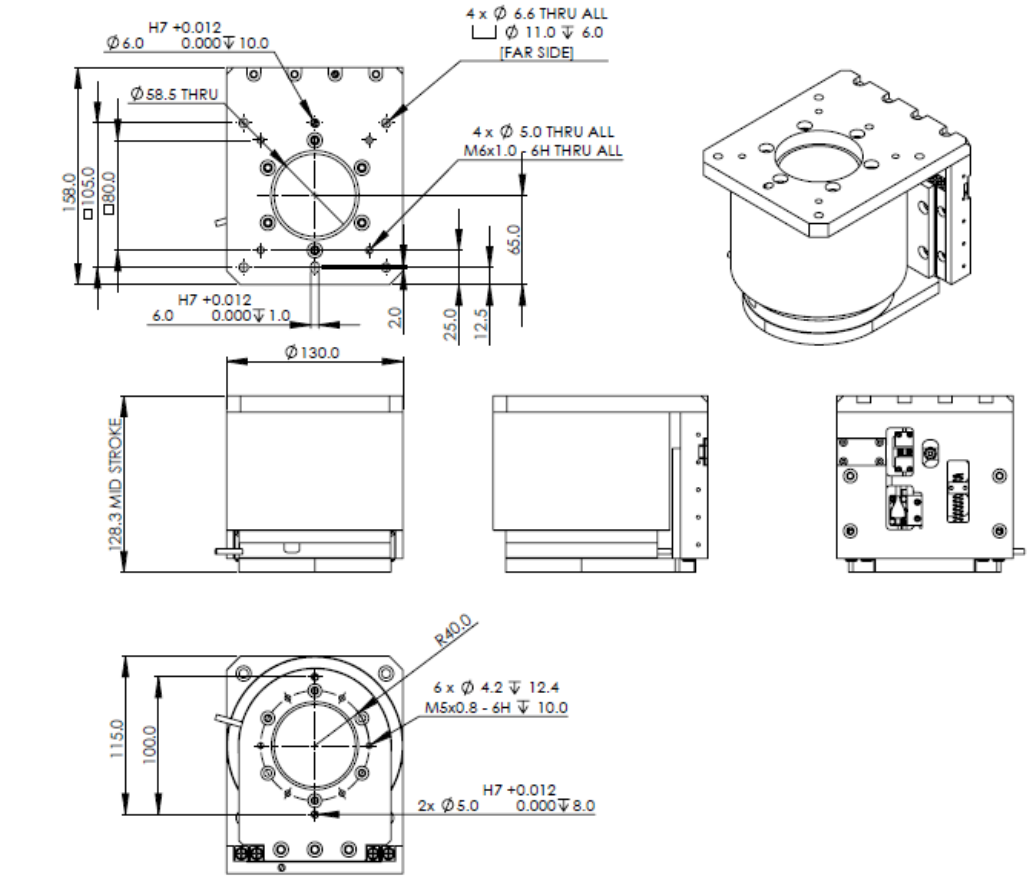
TGV 90



TGV 130



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Module Configuration

Model	Effective stroke	Moving mass	Total mass	Hard Stopper position
	(mm)	(Kg)	(Kg)	(mm)
TGV 130	8	1.55	7.91	10
TGV 90	4	0.74	2.86	5
TGV 50	8	0.68	1.98	10

Performance Parameter

Specification Parameter	Unit	
Straightness	µm	± 2.5
Flatness		± 2.5
Bidirectional Repeatability		± 0.5
Linearity without mapping		± 5
Linearity with mapping		± 1

Bearing Parameter

		TGV130	TGV90	TGV50
Maximum static load capacity	N	389	792	792
Recommended maximum load	N	3.09	0.83	1.42
Recommended Row moment	Nm	0.6	0.6	0.6
Recommended pitch moment	Nm	0.5	0.5	0.5
Recommended yaw moment	Nm	0.3	0.3	0.3

Recommended maximum load is based on the load in which the acceleration of the moving mass is at least 1G

Part Numbering

	Motor Size	Motor Cable	Encoder Type	Encoder Resolution (micron, µ)	Encoder Cable
TGV	130-HF-10-C23	0.3	[1]M1500, [1]M1600, [1]M3000, [1]M3500	1.0 – 0.005	1.0-5.0
	90-HF-5-C40				
	50-HF-10-C15				

1. With external Micro Photo sensor (Panasonic PM series)

Example: TGV130-HF-10-C23-M3000-0.02-3.0

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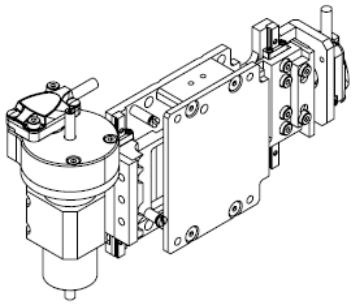
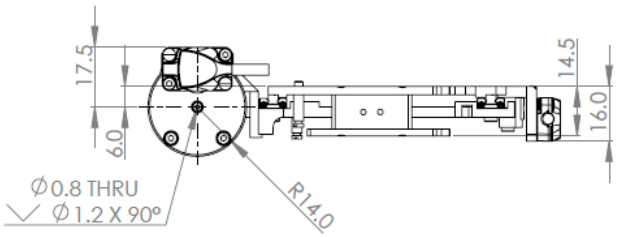
9.7 AZT Module

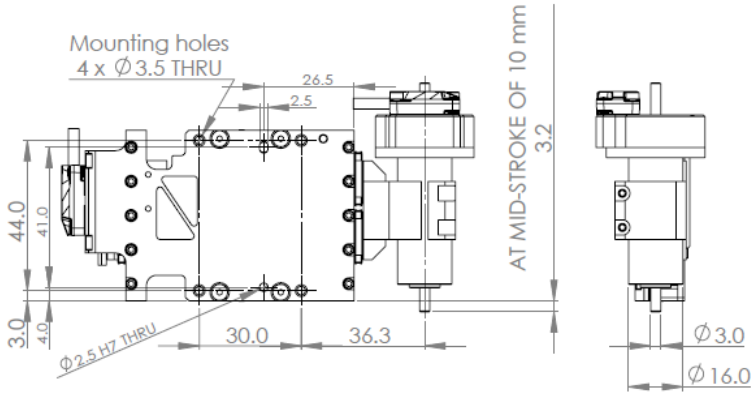
Motor Parameter

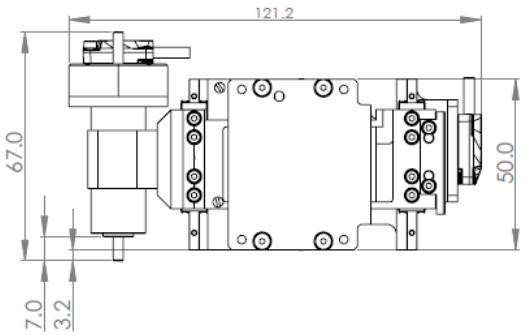
Model	DGV 16		ARC16-40	
	Unit		Unit	
Stroke	mm	10.0	degree	360
Continuous Force Coil @100ºC/Torque	N	4.0	mNm	9.1
Peak Force/Torque	N	12.0	mNm	36.4
Continuous current	A	2.0	Arms	2.6
Peak Current	A	6.0	Arms	10.4
Force Constant/Torque constant	N/A	2.3	mNm/Arms	3.5
Back EMF Constant	V/m/s	2.3	mV/rpm	0.3
Resistance	Ohms	1.0	Ohm	0.16
Inductance	mH	0.134	mH	0.02
Motor constant	N/SqRt(W)	2.3	mNm/SqRt(W)	8.8
Lines per revolution			lines/rev	2,600
Resolution	um	0.5	counts/rev (X40)	104,000
Moving mass/Rotor Inertia	Kg	0.028	gcm^2	47.67
Moving mass including Theta axis	Kg	0.083		
Total mass	Kg	0.275		

Mounting Holes









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Performance Parameter

DGV 16	unit	
Straightness	um	±3µm/25mm
Flatness	um	±3µm/25mm
Bidirectional repeatability (1um resolution)	um	±2µm

Part Numbering

Model	Motor Type	Stroke	Resolution	Theta Motor	Resolution
AZT16	AVA1	10	1	ARC16H	52000

Example: AZT16-AVA1-10-1-ARG16H-52000

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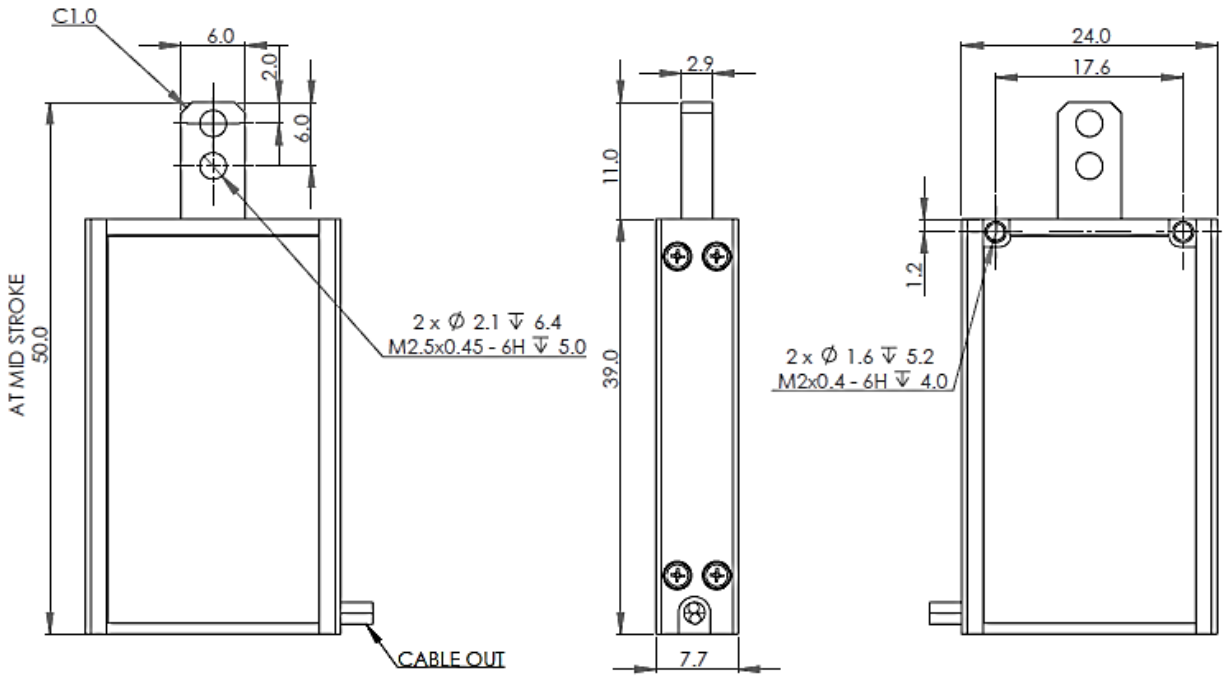
9.8 ATA Module

ATA-IG2

Model	Units	ATA-IG2-5	ATA-IG2-10
Stroke	mm	5	10
Force sensitivity (at mid stroke)	N/A	0.2	0.18
Back EMF constant	V/m/s	0.2	0.18
Continuous force	N	0.4	0.36
Peak force	N	1.6	1.44
Resistance	ohms	0.3	0.44
Continuous current	A	2	2
Peak current	A	8	8
Voltage at peak force	V	2.6	3.5
Actuator constant	N/SqRt(W)	0.35	0.27
Continuous power	W	1.3	1.8
Max coil temperature	Deg C	130	130
Moving mass	g	4.3	6.5

ATA-IG2-5



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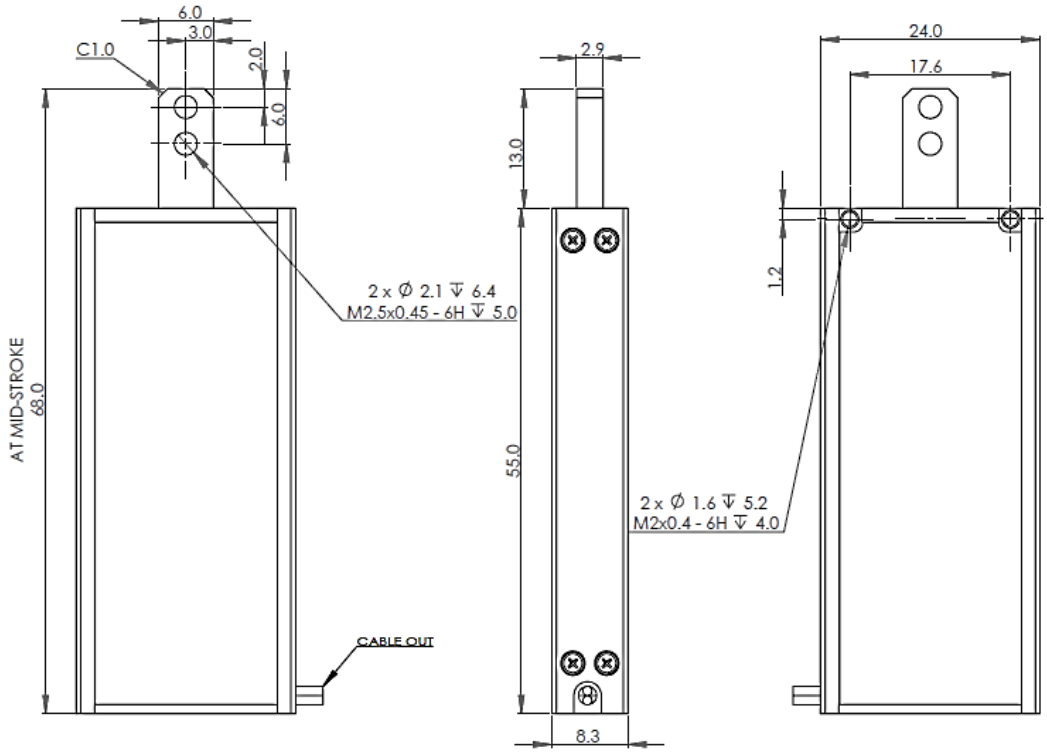
ATA-IG2-10



ATA-IG3

Model	Units	ATA-IG3-6	ATA-IG3-12
Stroke	mm	6	12
Force sensitivity (at mid stroke)	N/A	0.29	0.28
Back EMF constant	V/m/s	0.29	0.28
Continuous force	N	0.58	0.56
Peak force	N	2.32	2.24
Resistance	ohms	0.45	0.48
Continuous current	A	2	2
Peak current	A	8	8
Voltage at peak force	V	3.6	3.8
Actuator constant	N/SqRt(W)	0.43	0.4
Continuous power	W	1.8	1.9
Max coil temperature	Deg C	130	130
Moving mass	g	7.9	11.6

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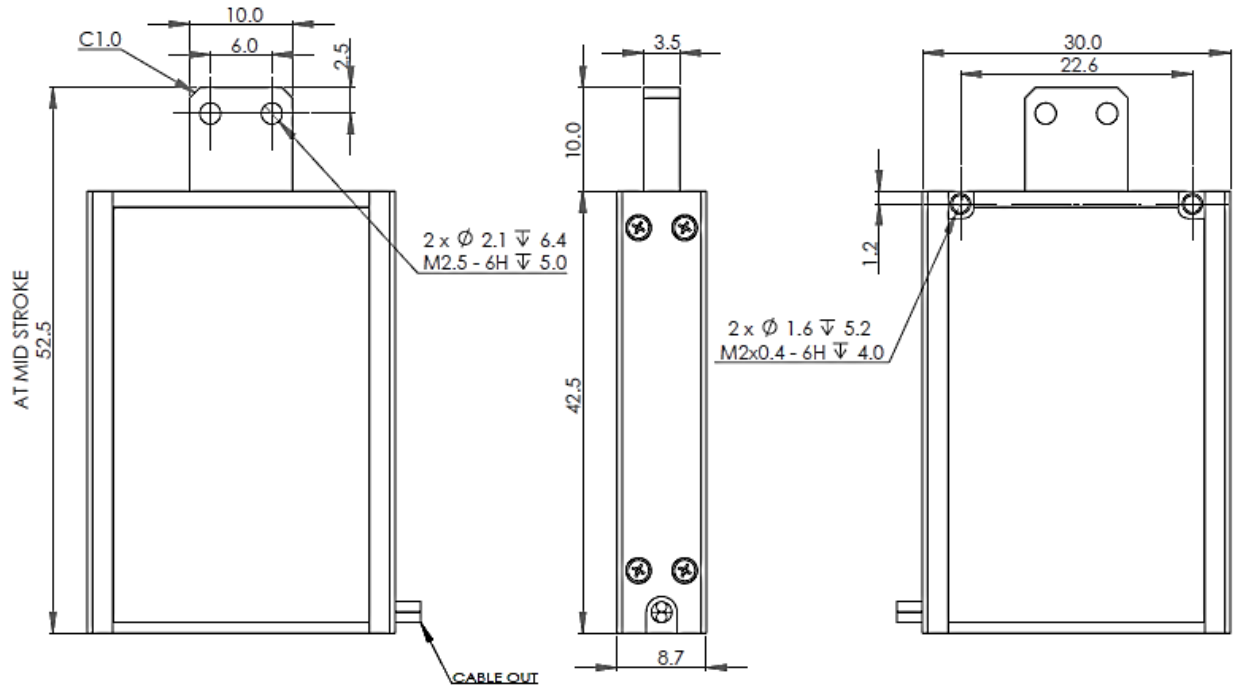
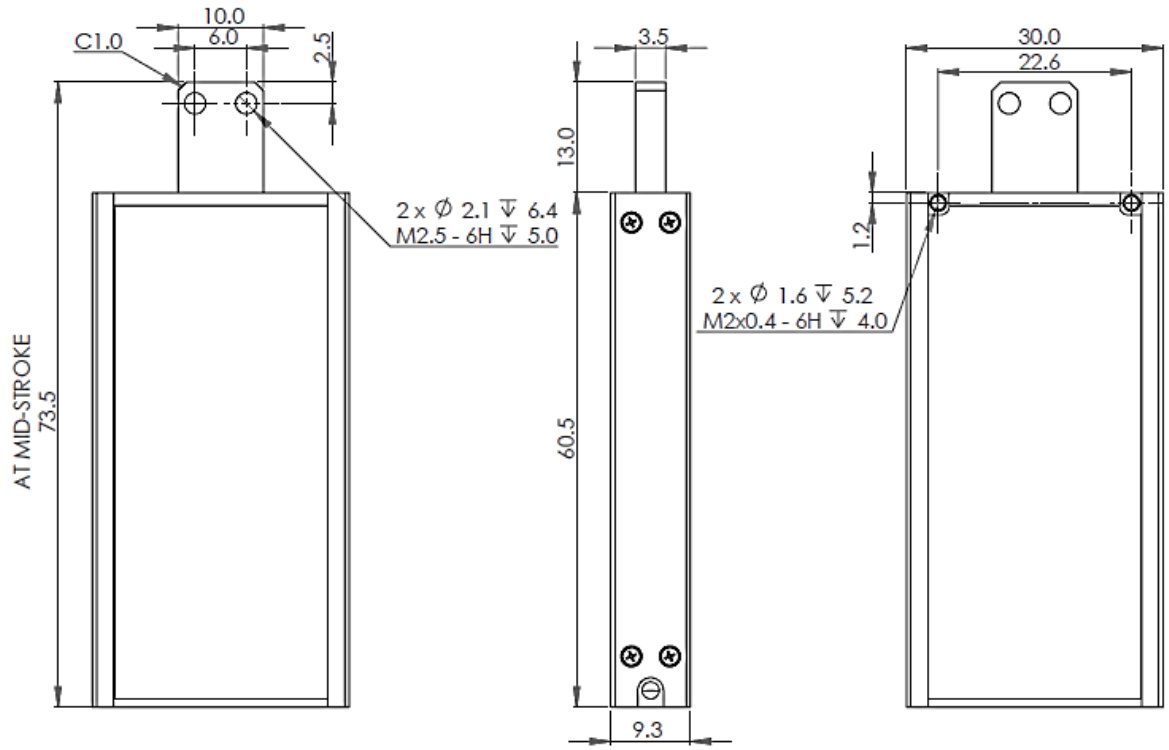
ATA-IG3-6



ATA-IG3-12



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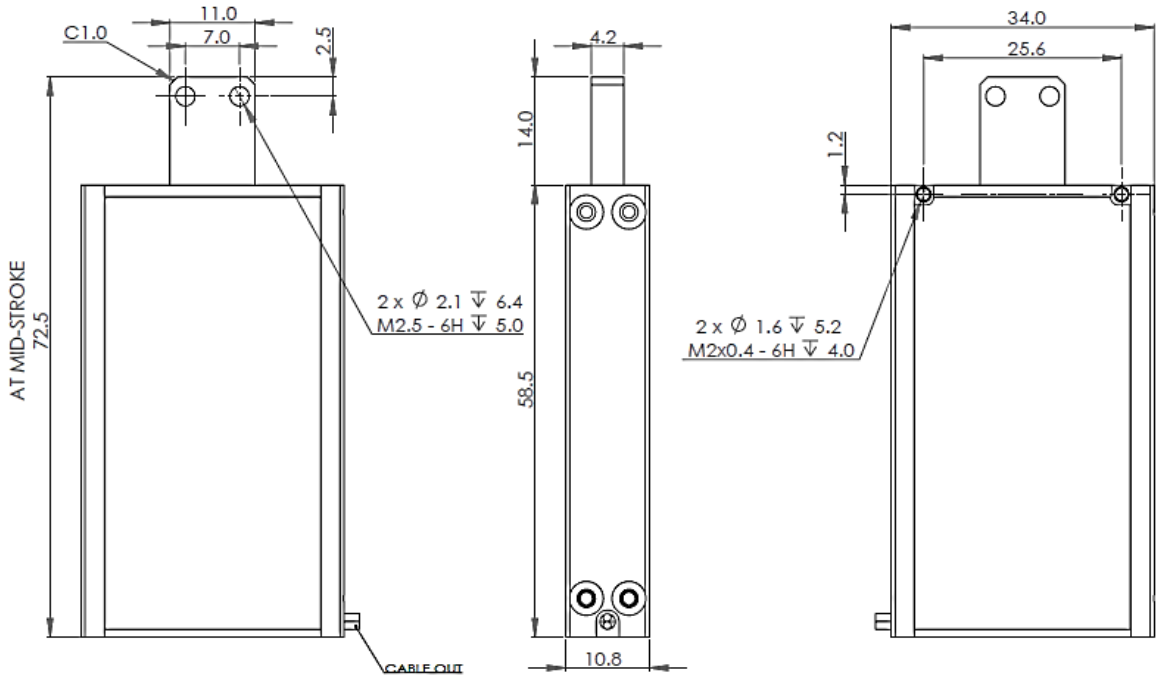
ATA-IG4

Model	Units	ATA-IG4-10	ATA-IG4-18
Stroke	mm	10	18
Force sensitivity (at mid stroke)	N/A	0.58	0.61
Back EMF constant	V/m/s	0.58	0.61
Continuous force	N	1.16	1.22
Peak force	N	4.64	4.88
Resistance	ohms	1.03	1.39
Continuous current	A	2	2
Peak current	A	8	8
Voltage at peak force	V	8.2	11.1
Actuator constant	N/SqRt(W)	0.57	0.52
Continuous power	W	4.1	5.6
Max coil temperature	Deg C	130	130
Moving mass	g	15.5	24.7

ATA-IG4-10



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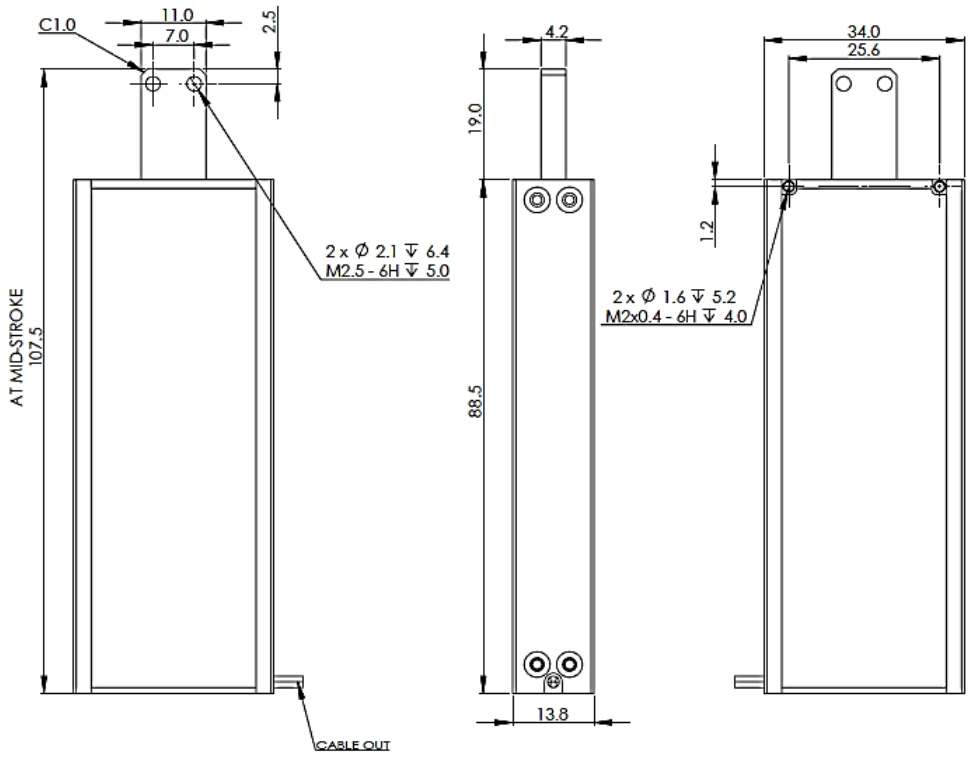
ATA-IG4-18



ATA-IG5

Model	Units	ATA-IG5-12	ATA-IG5-22
Stroke	mm	12	22
Force sensitivity (at mid stroke)	N/A	0.96	0.99
Back EMF constant	V/m/s	0.96	0.99
Continuous force	N	1.92	1.98
Peak force	N	7.68	7.92
Resistance	ohms	1.77	2.58
Continuous current	A	2	2
Peak current	A	8	8
Voltage at peak force	V	14.2	20.6
Actuator constant	N/SqRt(W)	0.72	0.62
Continuous power	W	7.1	10.3
Max coil temperature	Deg C	130	130
Moving mass	g	26.8	44.9

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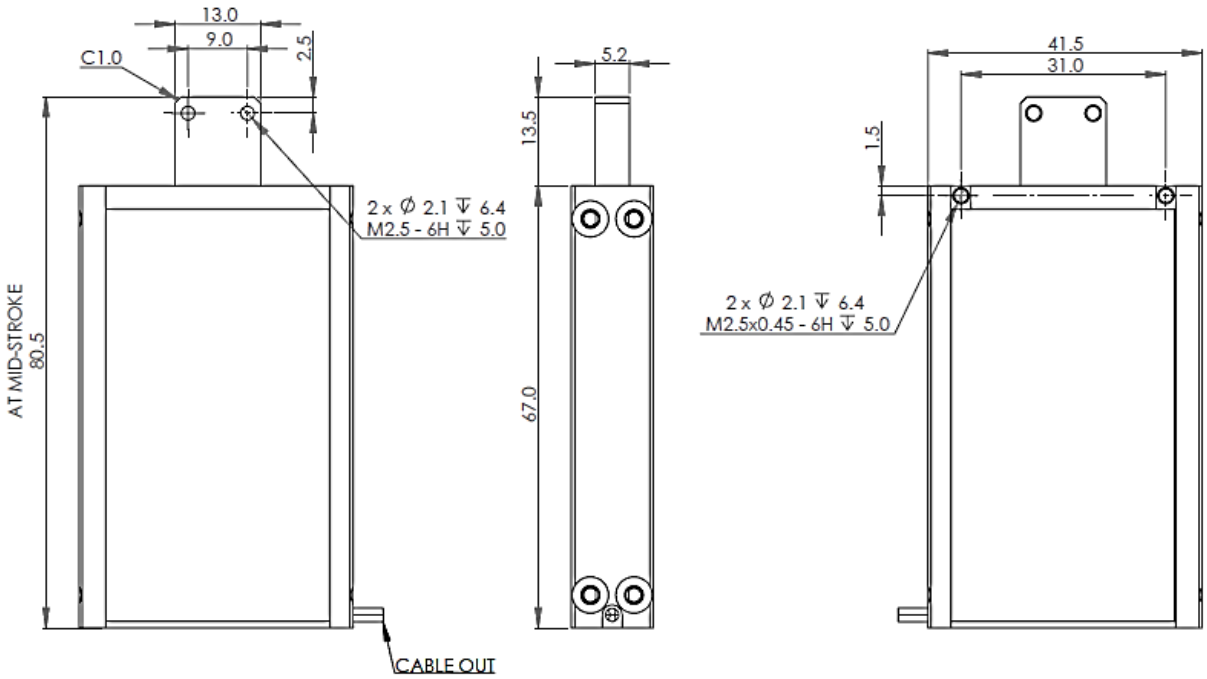
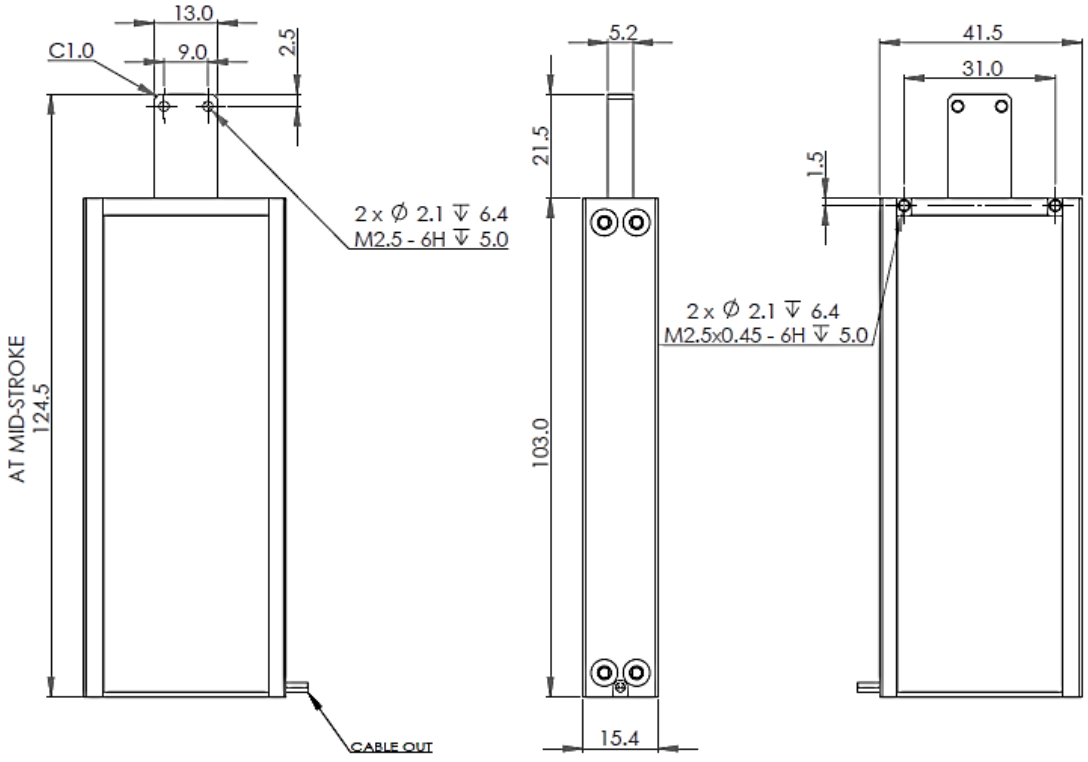
ATA-IG5-12



ATA-IG5-22



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Chapter 10 - Appendix2 – Cable Wiring

MGV - AVM30-15 / AVM40-20 / AVM60-25 / AVM90-30

AB11 (DIGITAL)

PIN	DESCRIPTION
5	A+
4	A-
10	B+
9	B-
14	IND+
15	IND-
12	+5V
13	GND

R41D / AT4 (DIGITAL)

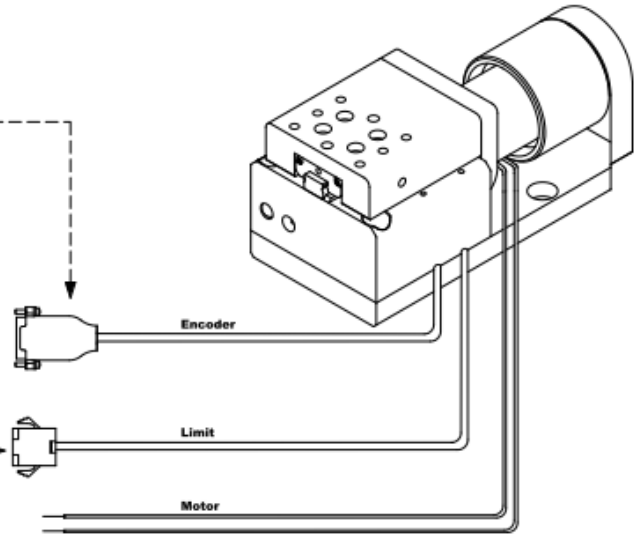
PIN	DESCRIPTION
14	A+
6	A-
13	B+
5	B-
12	Z+
4	Z-
8	+5V
9	GND
* 11	P
* 10	Q
* 2	GND

Limit Cable

PIN	DESCRIPTION
1	+5V~24V
2	GND
3	OUTPUT1
4	OUTPUT2

Motor Cable

PIN	DESCRIPTION
-	M1
-	M2



* Optical Switch is available,beside magnetic limit sensor,please refer to page __ : Optional Optical Switch

XRV - AVA1-20 / AVA2-20 / AVA3-20

Motor Cable

PIN	DESCRIPTION
-	M1
-	M2

AB (DIGITAL)

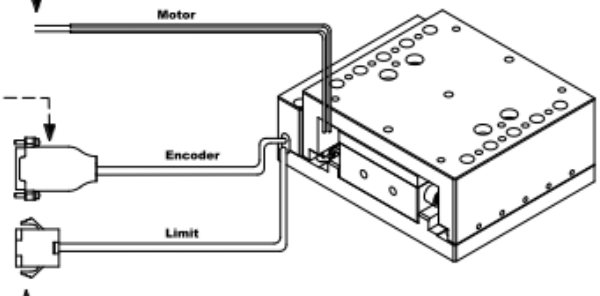
PIN	DESCRIPTION
5	A+
4	A-
10	B+
9	B-
14	IND+
15	IND-
12	+5V
13	GND

R41D / AT4 (DIGITAL)

PIN	DESCRIPTION
14	A+
6	A-
13	B+
5	B-
12	Z+
4	Z-
8	+5V
9	GND
* 11	P
* 10	Q
* 2	GND

Limit Cable

PIN	DESCRIPTION
1	+5V~24V
2	GND
3	OUTPUT1
4	OUTPUT2



* Optical Switch is available,beside magnetic limit sensor,please refer to page __ : Optional Optical Switch

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DGV - AVA1-C2-10 / AVA2-20 / AVA3-20

Motor Cable

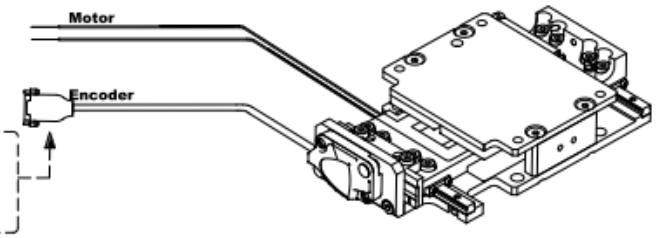
PIN	DESCRIPTIION
-	M1
-	M2

AB (DIGITAL)

PIN	DESCRIPTIION
5	A+
4	A-
10	B+
9	B-
14	IND+
15	IND-
12	+5V
13	GND

R41D / AT4 (DIGITAL)

PIN	DESCRIPTIION
14	A+
6	A-
13	B+
5	B-
12	Z+
4	Z-
8	+5V
9	GND
* 11	P
* 10	Q
* 2	GND



* Optical Switch is available,beside magnetic limit sensor,please refer to page __ : Optional Optical Switch

TGV - AVM50-HF / AVM90-HF / AVM130-HF

Motor Cable

PIN	DESCRIPTIION
-	M1
-	M2

AB (DIGITAL)

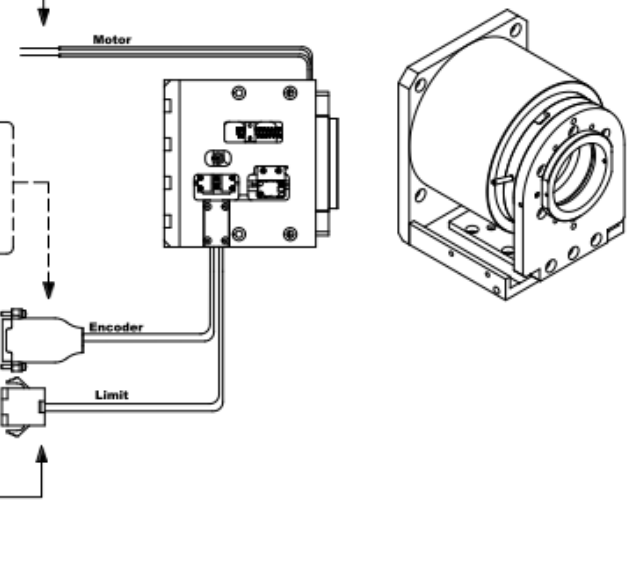
PIN	DESCRIPTIION
5	A+
4	A-
10	B+
9	B-
14	IND+
15	IND-
12	+5V
13	GND

R41D / AT4 (DIGITAL)

PIN	DESCRIPTIION
14	A+
6	A-
13	B+
5	B-
12	Z+
4	Z-
8	+5V
9	GND
* 11	P
* 10	Q
* 2	GND

Limit Cable

PIN	DESCRIPTIION
1	+5V~24V
2	GND
3	OUTPUT1
4	OUTPUT2



* Optical Switch is available,beside magnetic limit sensor,please refer to page __ : Optional Optical Switch

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AZT

Motor Cable

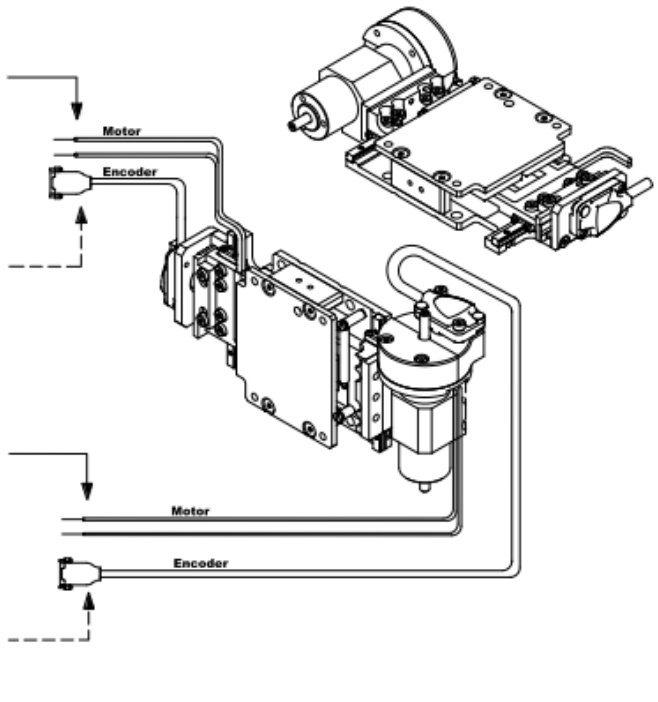
PIN	DESCRIPTIION
-	M1
-	M2

AB (DIGITAL)

PIN	DESCRIPTIION
5	A+
4	A-
10	B+
9	B-
14	IND+
15	IND-
12	+5V
13	GND

R41D / AT4 (DIGITAL)

PIN	DESCRIPTIION
14	A+
6	A-
13	B+
5	B-
12	Z+
4	Z-
8	+5V
9	GND
* 11	P
* 10	Q
* 2	GND



Motor Cable

PIN	DESCRIPTIION
-	M1
-	M2

AB (DIGITAL)

PIN	DESCRIPTIION
5	A+
4	A-
10	B+
9	B-
14	IND+
15	IND-
12	+5V
13	GND

R41D / AT4 (DIGITAL)

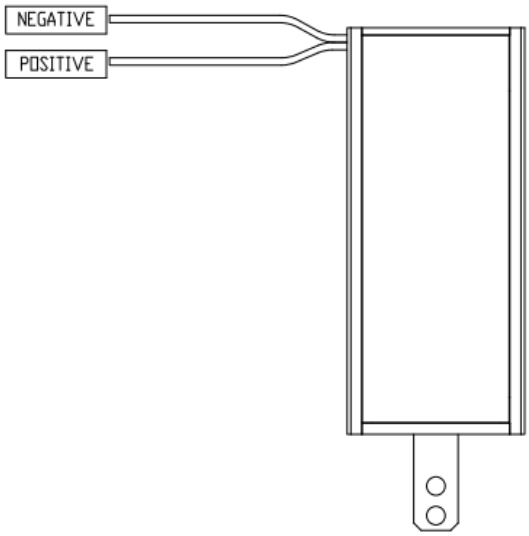
PIN	DESCRIPTIION
14	A+
6	A-
13	B+
5	B-
12	Z+
4	Z-
8	+5V
9	GND
* 11	P
* 10	Q
* 2	GND

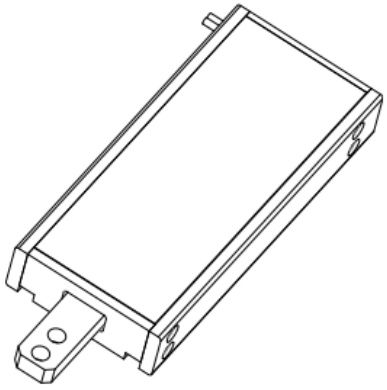
* Optical Switch is available,beside magnetic limit sensor,please refer to page __ : Optional Optical Switch

ATA

Motor Cable

PIN	DESCRIPTION	COLOR
-	POSITIVE	WHITE
-	NEGATIVE	BLACK





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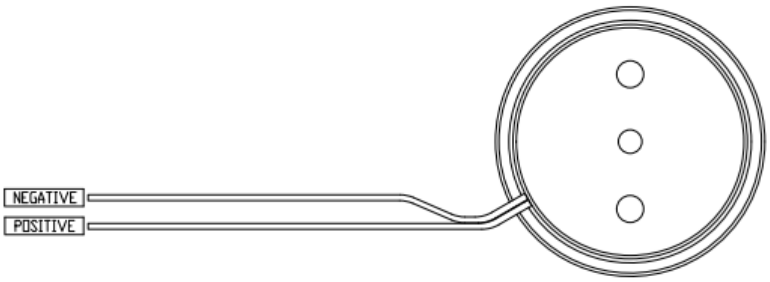
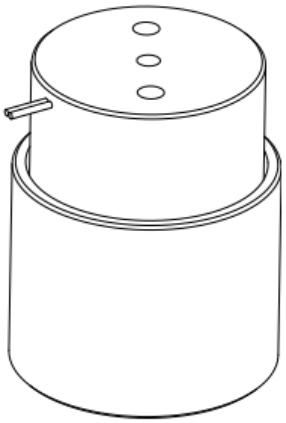
AVM

Motor Cable

PIN	DESCRIPTION	COLOR
-	POSITIVE	WHITE
-	NEGATIVE	BLACK

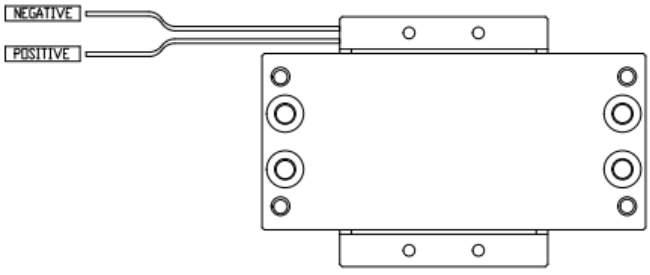


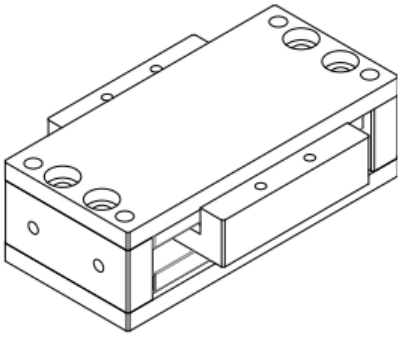


AVA

Motor Cable

PIN	DESCRIPTION	COLOR
-	POSITIVE	WHITE
-	NEGATIVE	BLACK





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Chapter 11 - CE Declaration

According to DIN VDE 0580:2000-07 Electromagnetic devices and components – General specifications

Manufacturer
Akribis Systems Pte Ltd.
5012 Techplace II Ang Mo Kio Ave 5 #01-05
569876 Singapore

This declaration relates exclusively to the following product in the state in which it was placed on the market and excludes components which are added and/or operations carried out subsequently by the final user. The declaration is no more valid, if the Product is modified without agreement.

Product denomination:	Voice coil motors
Model/type:	AVM, AVA, MGV, XRV, DGV, TGV, AZT
Year of manufacture:	from 2018

The manufacturer hereby declares that the product is complying with all essential requirements of the Directive DIN VDE 0580:2000-07 Electromagnetic devices and components – General specifications relating to electrical equipment.

The person authorized to compile the relevant technical documentation:

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