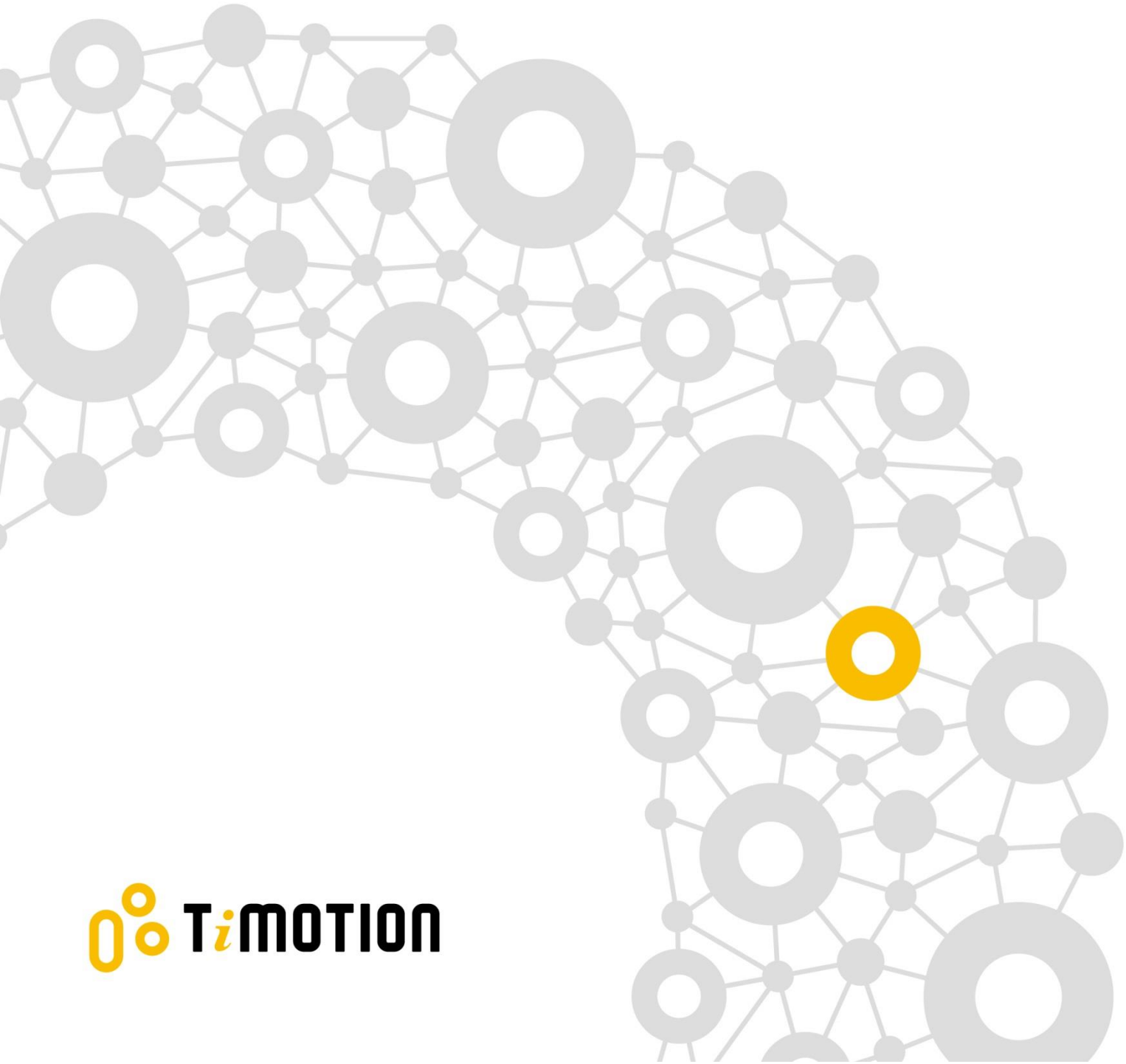
User Manual

VN2



TiMOTION

Contents

Glossary

The following terms and acronyms are being used in this manual.

- Vm+: The positive pole of power input.
- Vm-: The negative pole of power input.
- RPM: Number of turns per minute.
- AWG: American wiring gauge.
- LS: Limit switch installed inside the outer tube.
- Up LS: Upper limit switch is installed in fully extended end of stroke.
- Low LS: Lower limit switch is installed in fully retracted end of stroke.
- Mid LS: Middle limit switch is installed and the position is set by customer's request.
- N.C.: It is the pin of limit switch which is normally short circuit and changed to open when the switch is triggered.
- N.O.: It is the pin of limit switch which is normal open and changed to short circuit when the switch is triggered.
- C.: It is the common pin of limit switch when the circuit is either open or short.
- Vp: The reference voltage input to POT signal.
- Vout: The POT signal wire output value.

1.General

1.1 About this manual

This user manual is provided to the manufacturer of the equipment or system rather than end users. This manual provides information needed to install, use and maintain the TiMOTION products. Manufacturers are responsible to provide a user guide to the end users using the relevant safety information passed from this manual.

This manual contains installation directions as well as technical data for the TiMOTION industrial electric linear actuators. Carefully read through each section of the user manual before the equipment is unpacked, installed or operated. Please note all the dangers, warnings, cautions and notes stated in this manual. Please follow the instructions provided in this manual to ensure safe, reliable operation.

1.2 Target Personnel

Please allow qualified mechanical and electrical professionals to perform all installation, maintenance and replacement of the TiMOTION products. Please keep the products away from people who do not have the required experiences or knowledge of the product.

1.3 Warranty

In general, TiMOTION provides a 24-month warranty on Industrial Motion actuators based on the manufacturing date. The warranty is valid only if the equipment is properly operated and maintained correctly. The application of the product is the responsibility of the buyer. TiMOTION makes no representation or warranty as to the product's suitability for any particular use or purpose.

1.4 Transport and storage

The actuator should only be stored and transported in the original TiMOTION packaging. The temperature during transportation and storage must be between -25 to +65° C (-13 to +149° F). Please avoid shocks to the package. If the package is damaged, check the actuator for visible damage and notify the carrier and TiMOTION.

1.5 Packaging

The sample order packaging contains the product and the QR code directly to this manual. For large quantity orders, packaging may vary, and TiMOTION reserves the right to change it.

1.6 Support

If any technical support or information is needed for this product, please contact your TiMOTION sales engineer. You can also visit https://www.TiMOTION.com/en for the product or contact information.

1.7 Disclaimer

This user manual has been written based on our current technical knowledge. TiMOTION is continuously working on updating the product information. We reserve the right to carry out technical modifications.

1.8 Notification and warnings

1.8.1 Mounting/dismounting the actuator

- Please read through this user manual before working on the equipment that the actuator is or shall be a part of.
- Adhere to the information contained in this user manual and on the product label. Never exceed the performance limits stated herein.
- Be sure the actuator is not in operation.
- Ensure the actuator is free from loads that could be released during mounting or dismounting.
- Refrain from unplugging any cables or connectors during operation or while power is on.
- Immediately stop using the actuator if it seems faulty or damaged. Notify your TiMOTION sales engineer so corrective actions can be taken.
- Never disassemble the actuator as that will compromise the sealing and could impact the function of the actuator. Disassembly will lose warranty.
- Grease may be present on the extension tube. Contact with the grease is non-hazardous. Please refrain from removing the film.

1.8.2 Operation

- Be sure the actuator is correctly mounted as indicated in the user instructions.
- Be sure the equipment can be moved easily over the actuator's whole working area.
- Be sure the actuator is connected to a main electricity supply/transformer with the correct voltage specified on the actuator label.

- Be sure that the connection bolts are secured safely and can withstand the wear.
- Stop the actuator immediately if anything unusual is observed.
- Ensure there is no side load present on the actuator.
- Only use the actuator within the specified working limits.
- Refrain from having any contact with the actuator.

1.8.3 Equipment power off

- Switch off the main supply to prevent any unintentional operation.
- Regularly check for extraordinary wear.

1.8.4 Duty cycle

- The standard-duty cycle is 25%.
- If the product is customized, please refer to the approval drawings.

1.8.5 Temperature

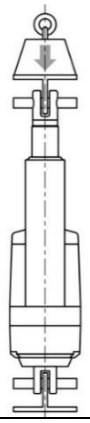
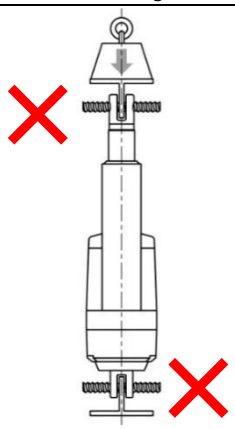
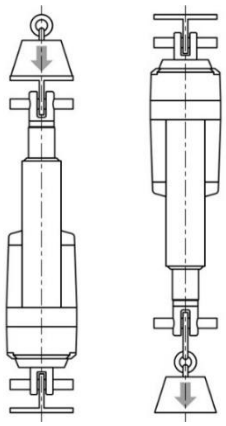
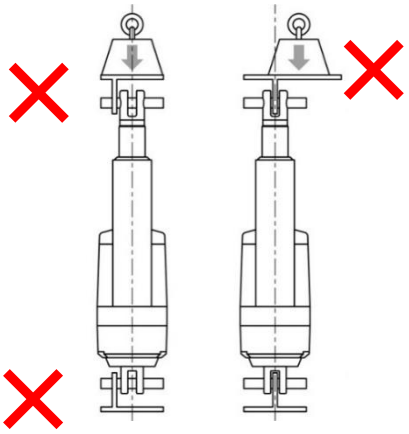
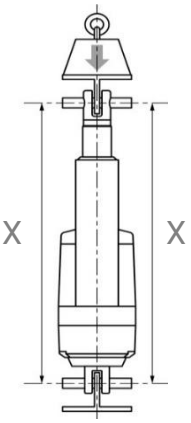
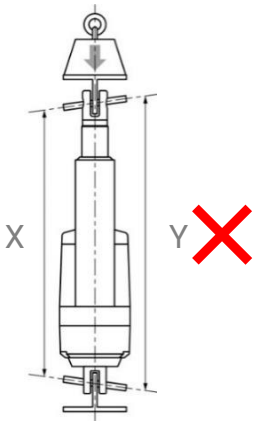
- The operating temperature range is -25°C ~+65°C.
- The operational temperature range at full performance is +5°C ~+45°C.

2.Installation

2.1 Mechanical installation

2.1.1 Mounting notice

◆ Use solid mounting pins with the proper dimension and support them at both ends.

Note	Correct	Wrong
Please mount the actuator with the mounting pins of correct dimension and without threaded at both ends of the attachments.		
Do not mount the actuator with the pins in different rotated angles, this could cause stress on the nut during operation. The load should act along the stroke axis of the actuator from the front attachment, inner tube to the rear attachment. Off center or side loads may cause bending and lead to failure.		
Be sure the mounting pins must be parallel to each other. If the pins are not parallel to each other the actuator might be bend and could be damaged.		

2.1.2 Safety Instructions

It is important to follow these instructions for the safety of users and operators. These instructions should be kept in a safe place for the entire service life of the products.

Risk of crushing and entrapment! Window can close automatically!

The integrated load cut-off stops the drive during closing and opening when the drive is overloaded. The compressive force can crush fingers in the event of carelessness.

Area of application

The drive shall only be used according to its intended use. For additional applications consult the manufacturer or his authorized dealer.

Do not misuse the drive for other lifting operations! Do not allow children to play with this drive or its regulating control units, including the remote control!

Always check whether the system complies with current regulations. Special attention must be paid to the opening width, the opening area, the opening time, the opening speed of the window, the temperature range of the drives/external devices and cables, as well as the cross section of the connecting cables as function of the cable length and power consumption.

All devices must be permanently protected from dirt and moisture if the drive is not explicitly suitable for use in wet areas (see technical data).

Installation

These instructions address expert and safety-conscious electricians and/or qualified personnel knowledgeable in electrical and mechanical drive installation.

The safe operation and avoidance of injury, as well as avoidance of damaging the property, is only guaranteed by proper installation and setup utilizing these installation instructions.

All specifications for installation must be checked independently and, if necessary, adjusted at the installation site. The connection assignment, the electrical supply data (see machine plate) and performance limits (see technical data) as well as the mounting and installation instructions of the drive must be strictly observed and adhered to!

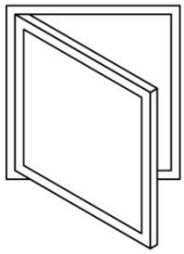
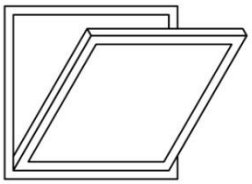
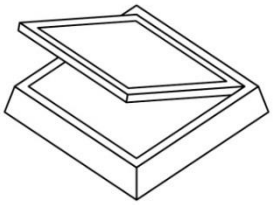
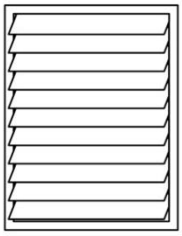
NEVER connect 24 V DC drives to the 230 V AC main voltages. This could create life threatening injuries.

Do not reach into the window rabbet or the operating element (chain or spindle) during installation and operation! Ensure that, based on the installation position and the opening movement of the casement, persons cannot be trapped between the driven part of the window and surrounding fixed components (e.g. wall).

Mounting material

The required mounting material must be modified to fit the drive and occurring load and, if necessary, supplemented.

Before installing the drive, check whether the casement is in good mechanical condition, the weight is balanced and whether it opens and closes easily!

Danger spots by crush and shear points			
			
Side-hung	Bottom-hung	Roof windows	Louver windows

Crush and shear points

To avoid injuries, crushing and shear points between casement and frame must be secured against entrapment up to an installation height of 2.5 meters above the floor with appropriate measures. This can be achieved by using contact-based or contactless protective devices against entrapment. This stops the motion through contact by a person. the motion through contact or through interruption by a person. At a force higher than 150N at the main closing edge, the motion must stop within 20mm. A warning symbol at the opening element must indicate this clearly.

Unintentional or independent opening or falling

Casements need to be hinged/secured in such a way that in the event one of the mounting elements fails, it will not crash down/move in an uncontrolled manner. Use double suspensions, safety scissors, and casement stays to ensure it will not slam down.

Tilting windows shall be equipped with safety scissors or similar devices to avoid damages and risks of injury for persons through improper installation and operation. The safety scissors must be adjusted to the opening stroke of the drive (see technical data) to avoid blocking. The opening width of the safety

scissors must be bigger than the drive stroke.

Routing cables and electrical connection

Routing electrical lines and connections may be performed only by approved specialist companies. Never operate drives, control units, operating elements and sensors at operating voltages and connections contrary to the specifications of the manufacturer.

All disconnecting devices shall be installed in the permanent electrical installation or external Control Unit for the drive. The main supply lines 230 V / 400 V AC need to be protected separately! Damage to main supply lines of drives with plug connectors may only be re- placed by the manufacturer or qualified service / maintenance personnel!

Power cables fixed to the drive casing cannot be replaced. If the cable is damaged the device must be scrapped!

The types of cable, cable lengths and cross-sections will be selected in accordance with the manufacturer's technical data. If necessary, the able types should be coordinated with local experts. Low-voltage lines (24 V DC) need to be routed separately from high voltage lines. Flexible cables should not be flush-mounted and freely suspended cables need to be equipped with strain reliefs.

Cables need to be laid so they cannot be sheared, twisted or bent during operation. Drive cables laid into closed window profiles must be protected by insulating tubes with a sufficient temperature resistance. Through holes shall be equipped with cable sleeves!

2.2 Electrical installation

2.2.1 Important notice

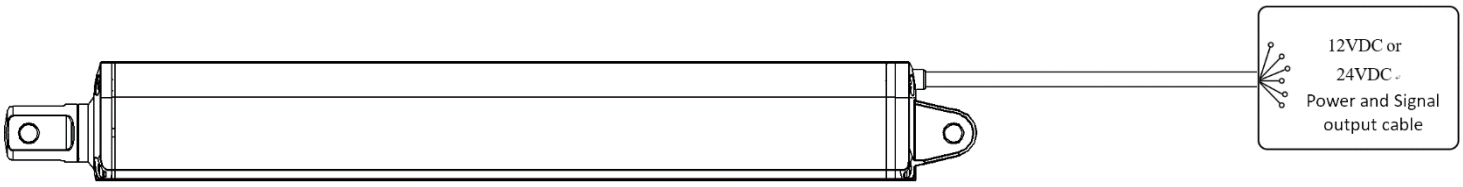
- Make sure the leads/cables leading to the motor are rated to handle the maximum current.
- To reduce the chance of a crushing hazard, we recommend an emergency stop.
- If you are not using soft stop on a DC-motor, a short peak of high voltage will be sent towards the power supply. When selecting the power supply, please ensure it is able to withstand the peak of high voltage.
- To reduce the chance of interference, refrain from placing signal cables along power cables.
- Use a two-wire system to prevent ground loop.
- Please use shielded signal cables with applications that can be sensitive or if there is interference risk.
- Please note, using long cables in combination with small lead cross-sections and low voltages could lead to a malfunction due to voltage drop.
- Use spark protection on relays and other coil operated devices.
- Please be sure the power to the actuator is off before working on the actuator and the wiring.

2.2.2 Extension power cable

The actuator is supplied with a power cable (and/or signal cable). The cable(s) has/have flying leads in one end for the user's equipment connections. On the other end of the actuator, the cable is integrated into the connector cover. The plug-in connector allows the user to replace the actuator without disconnecting the flying leads.

It is important to use the extension power cable from the DC source with proper size to avoid a significant voltage drop. The further away the DC source is, the larger the extension cable may need to be. Please refer to the following table for the recommendation of the extension power cable size.

Cable type	Length of cable (L)	Min. allowed cross section (X)
Power cable	0 - 5 m	1.5 mm [AWG 20]
Signal cable	<10 m	1.0 mm [AWG 26]
	>10 m	Check with your TiMOTION contact window



2.2.3 Inrush current

When starting the actuator, there is an inrush current to the motor that will last between 75 to 150 milliseconds (up to four times the rated current).

If using an AC power supply, please be sure it is sized to handle the inrush current (batteries typically have no issues delivering the inrush current). Please be sure all contacts, switches and relays are sized appropriately to be able to handle the inrush current.

2.3 Wiring definition

Below is the standard wiring definition of the actuator. If your actuator is ordered with customized wiring, please contact TiMOTION sales for detailed information.

2.3.1 Limitations for limit switches output signals

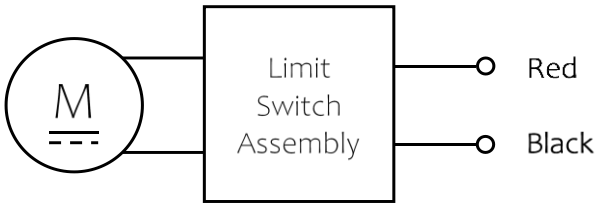
In general, the VN2 cable can have a maximum of 6 pins– (2 power wire pins and/or up-to 4 signal wire pins)
The function limitations for limit switches to output signals are shown in the table below:

Function for limit switches	Signal output		
	Without	Single Hall	Double Hall
2 limit switches to cut off the actuator	2.3.2	2.3.4	2.3.6
2 limit switches to send a signal	2.3.3	2.3.5	2.3.7

Note: Please contact the TiMOTION sales engineer if the signal outputs are customized.

2.3.2 Two limit switches to cut the actuator (without signal output)

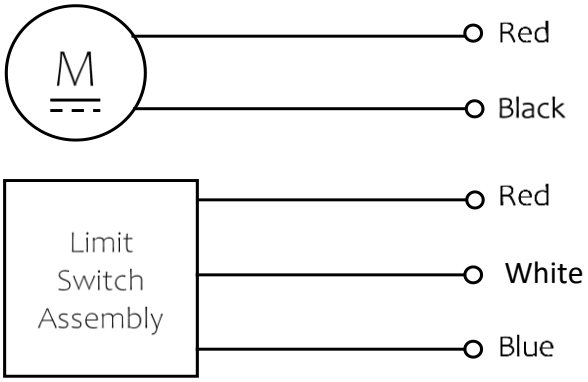
The actuator is equipped with two limit switches to cut off the actuator when the actuator moves to the end of each stroke and without any output signal.



Wire	AWG	Description	Spec
Red	20	Connect to Vm+ to extend the actuator. Connect to Vm- to retract the actuator.	24V version: Input voltage 18~32 V DC. 12V version: Input voltage 9~16 V DC.
Black	20	Connect to Vm- to extend the actuator. Connect to Vm+ to retract the actuator.	

2.3.3 Two limit switches to send the signal

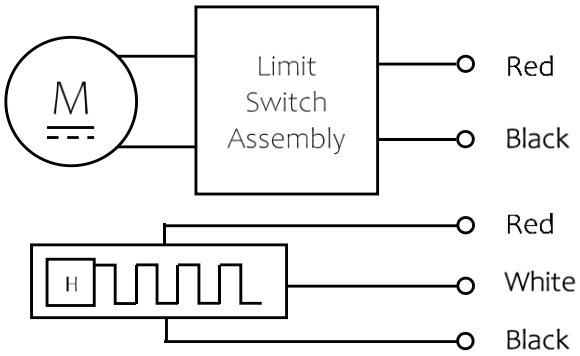
The actuator has two limit switches to send out the signal at fully extended or retracted stroke positions.



Wire	AWG	Description	Spec
Red	20	Connect to Vm+ to extend the actuator. Connect to Vm- to retract the actuator.	24V version: Input voltage 18~32 V DC. 12V version: Input voltage 9~16 V DC.
Black	20	Connect to Vm- to extend the actuator. Connect to Vm+ to retract the actuator.	
White	26	Connect to up limit switch normal close pin (N.C.)	The signal is potentially free and independent from the motor power circuit. Both white and blue signal wires are normally closed circuits when the actuator is in the middle of the stroke. The signal circuit is connected to the motor power circuit, and the value Vm+ depends on actuator voltage. Connect the limit switch signal wire to the load <1A.
Blue	26	Connect to low limit switch normal close pin (N.C.)	
Red	26	Common wire	

2.3.4 Two limit switches and a single Hall sensor

The actuator is equipped with two limit switches to cut off the actuator when the actuator moves to the end of each stroke and with a single Hall sensor sending position signal output.



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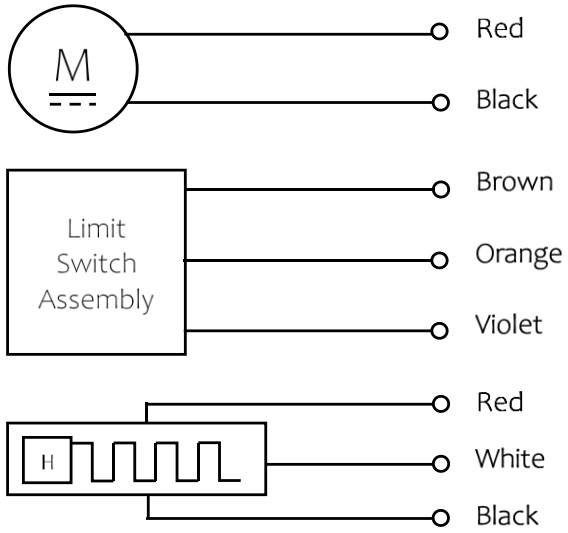
Wire	AWG	Description	Spec
Red	20	Connect to Vm+ to extend the actuator Connect to Vm- to retract the actuator	24V version: Input voltage 18~32 V DC 12V version: Input voltage 9~16 V DC
Black	20	Connect to Vm- to extend the actuator Connect to Vm+ to retract the actuator	
Red	26	+5V DC input signal power for Hall sensor board.	Hall sensor output signal type is a square wave with Hi voltage 5V and Low voltage 0V, and with the output current of 0.1A (please refer to the approval drawing for the resolution and details).  Hall sensor circuit is independent to motor power circuit.
White	26	Output Hall sensor signal during the actuator moves.	
Black	26	Hall sensor signal ground.	

2.3.5 Two limit switches send the signal and a single Hall sensor

The actuator is equipped with two limit switches to send out the signal at fully extended or retracted stroke positions and with single Hall sensors sending position signal output.



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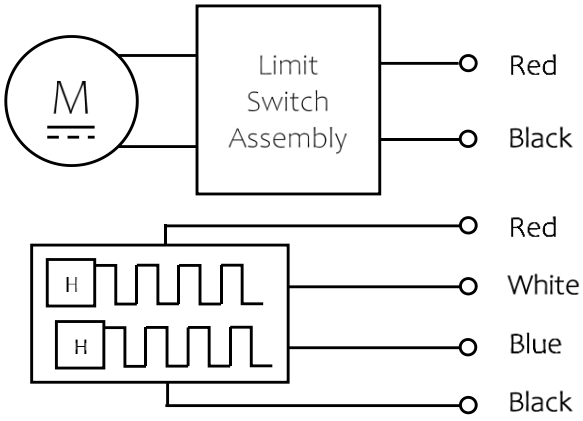
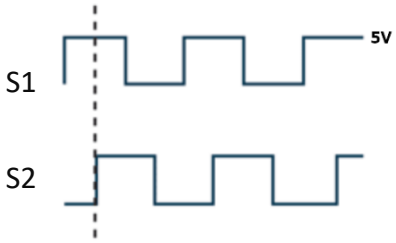
Wire	AWG	Description	Spec
Red	20	Connect to Vm+ to extend the actuator Connect to Vm- to retract the actuator	24V version: Input voltage 18~32 V DC 12V version: Input voltage 9~16 V DC
Black	20	Connect to Vm- to extend the actuator Connect to Vm+ to retract the actuator	
Red	26	+5V DC input signal power for Hall sensor board.	Hall sensor output signal type is square wave with Hi voltage 5V and Low voltage 0V, and with the output current of 0.1A (please refer to the approval drawing for the resolution and details).  Hall sensor circuit is independent to motor power circuit.
White	26	Output Hall sensor signal during the actuator moves.	
Black	26	Hall sensor signal ground.	
Brown	26	Connect to up limit switch normal open pin (N.O.)	The signal is NOT potential free and actively outputs voltage at each end of the stroke.

Orange	26	Connect to low limit switch normal open pin (N.O.)	Both of the brown and orange signal wire are normal open circuit when the actuator is in the middle of the stroke. The signal circuit is connected to motor power circuit and the value Vm+ depends on actuator voltage. Connect the limit switch signal wire to the load <1A.
Violet	26	Common wire	

2.3.6 Two limit switches and double Hall sensors

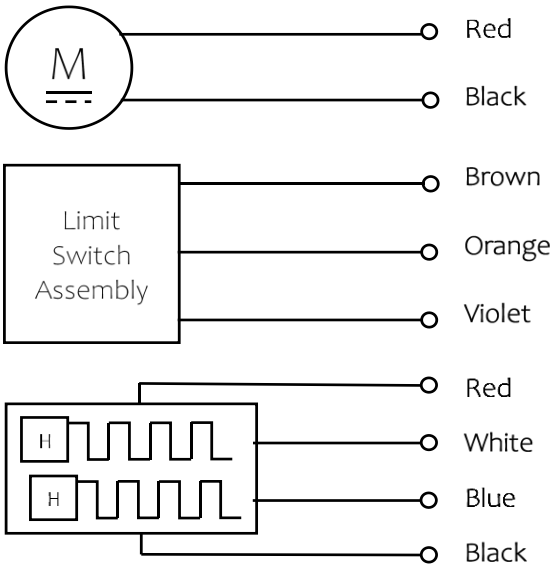
The actuator is equipped with two limit switches to cut off the actuator when the actuator moves to the end of each stroke, and with double Hall sensors sending position signal output.



Wire	AWG	Description	Spec
Red	20	Connect to Vm+ to extend the actuator Connect to Vm- to retract the actuator	24V version: Input voltage 18~32 V DC 12V version: Input voltage 9~16 V DC
Black	20	Connect to Vm- to extend the actuator Connect to Vm+ to retract the actuator	
Red	26	+5V DC input signal power for Hall sensor board.	Hall sensor output signal type is square wave with Hi voltage 5V and Low voltage 0V, and with the output current of 0.1A (please refer to the approval drawing for the resolution and details). S1 leads 90 degrees' phase to S2.  Hall sensor circuit is independent to motor power circuit.
White	26	Output Hall sensor signal S1 during the actuator moves.	
Blue	26	Output Hall sensor signal S2 during the actuator moves.	
Black	26	Hall sensor signal ground.	

2.3.7 Two limit switches send the signal and double Hall sensors

The actuator is equipped with two limit switches to send out the signal at fully extended or retracted stroke positions and with double Hall sensors sending position signal output.



Wire	AWG	Description	Spec
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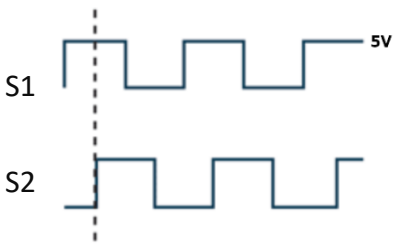
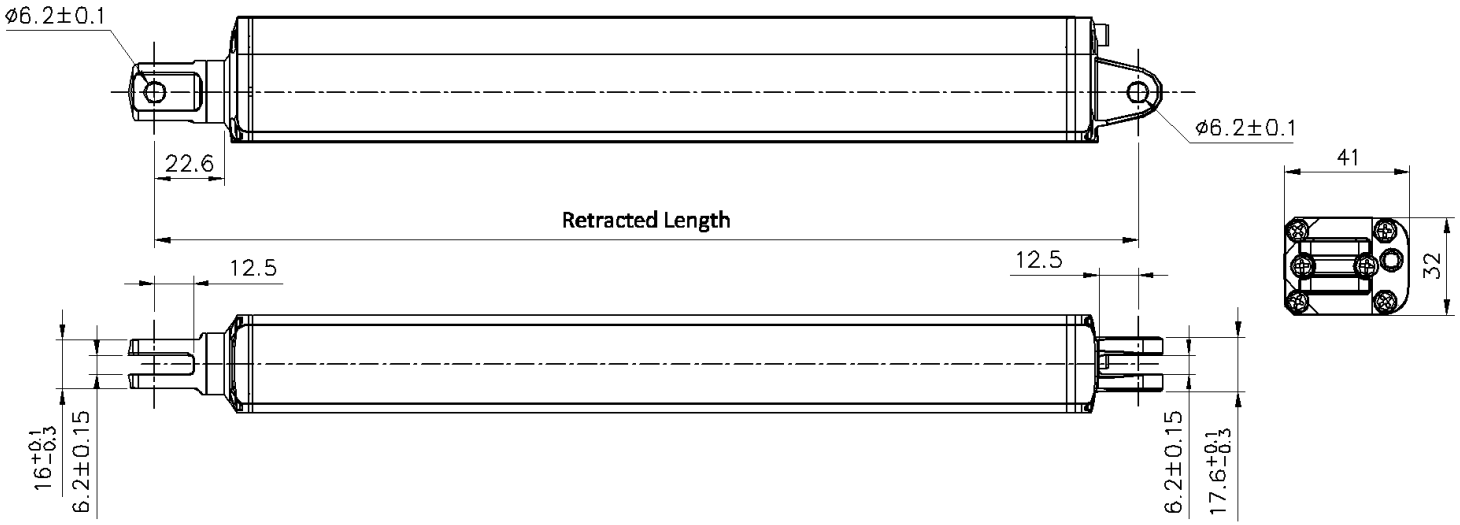
Red	26	+5V DC input signal power for Hall sensor board.	Hall sensor output signal type is a square wave with Hi voltage 5V and Low voltage 0V, and with the output current of 0.1A (please refer to the approval drawing for the resolution and details). S1 leads 90 degrees' phase to S2. 
White	26	Output Hall sensor signal S1 during the actuator movement.	
Blue	26	Output Hall sensor signal S2 during the actuator movement.	

Black	26	Hall sensor signal ground.	The Hall sensor circuit is independent of the motor power circuit.
Brown	26	Connect to upper limit switch normal close pin (N.C.)	The signal is potentially free and independent from the motor power circuit. Both brown and orange signal wires are normally closed circuits when the actuator is in the middle of the stroke. The signal circuit is connected to the motor power circuit, and the value Vm+ depends on actuator voltage. Connect the limit switch signal wire to the load <1A.
Orange	26	Connect to lower limit switch normal close pin (N.C.)	
Violet	26	Common wire	

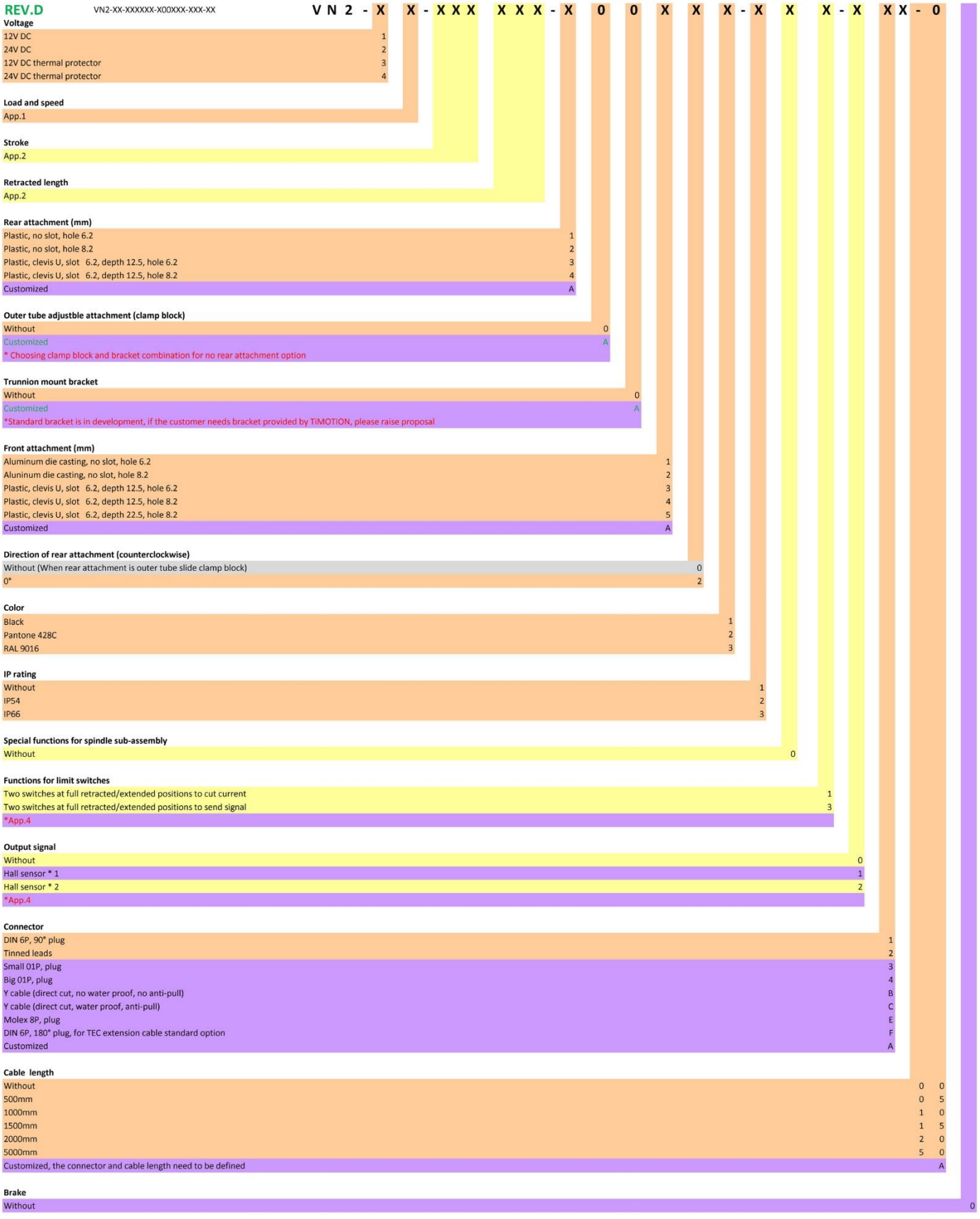
3.Product specifications

3.1 2D drawings



3.2 Ordering key

*Please contact your TiMOTION sales engineer for the latest revision ordering key.



4.Troubleshooting

Please find the table which lists the symptoms, possible cause and recommend action.
If the problem could not be solved, please contact your TiMOTION sales engineer.

Symptom	Possible cause	Action
Motor runs, but spindle does not move	Gearing system or spindle damaged	Please contact your TiMOTION sales engineer.
No motor sound or movement	The actuator is not properly connected to the power supply	Check the connection to the power supply or the external control unit
	Customer fuse burned	Check the fuse
	Cable damaged	Please contact your TiMOTION sales engineer.
Excessive power consumption	Misalignment or overload in the application	Align or reduce the load Try running the actuator without load
Actuator cannot lift full load or motor runs too slowly	Insufficient power supply	Check the power supply is properly plugged in
	Load is higher than specified	Reduce the load
No signal or incorrect feedback output	Cable damaged	Please contact your TiMOTION sales engineer.
	Wrongly connected	Check the wiring
	Signal is constantly high/low	Run the actuator to full extension and retraction
		Reconnect the cables and set parallel configuration again