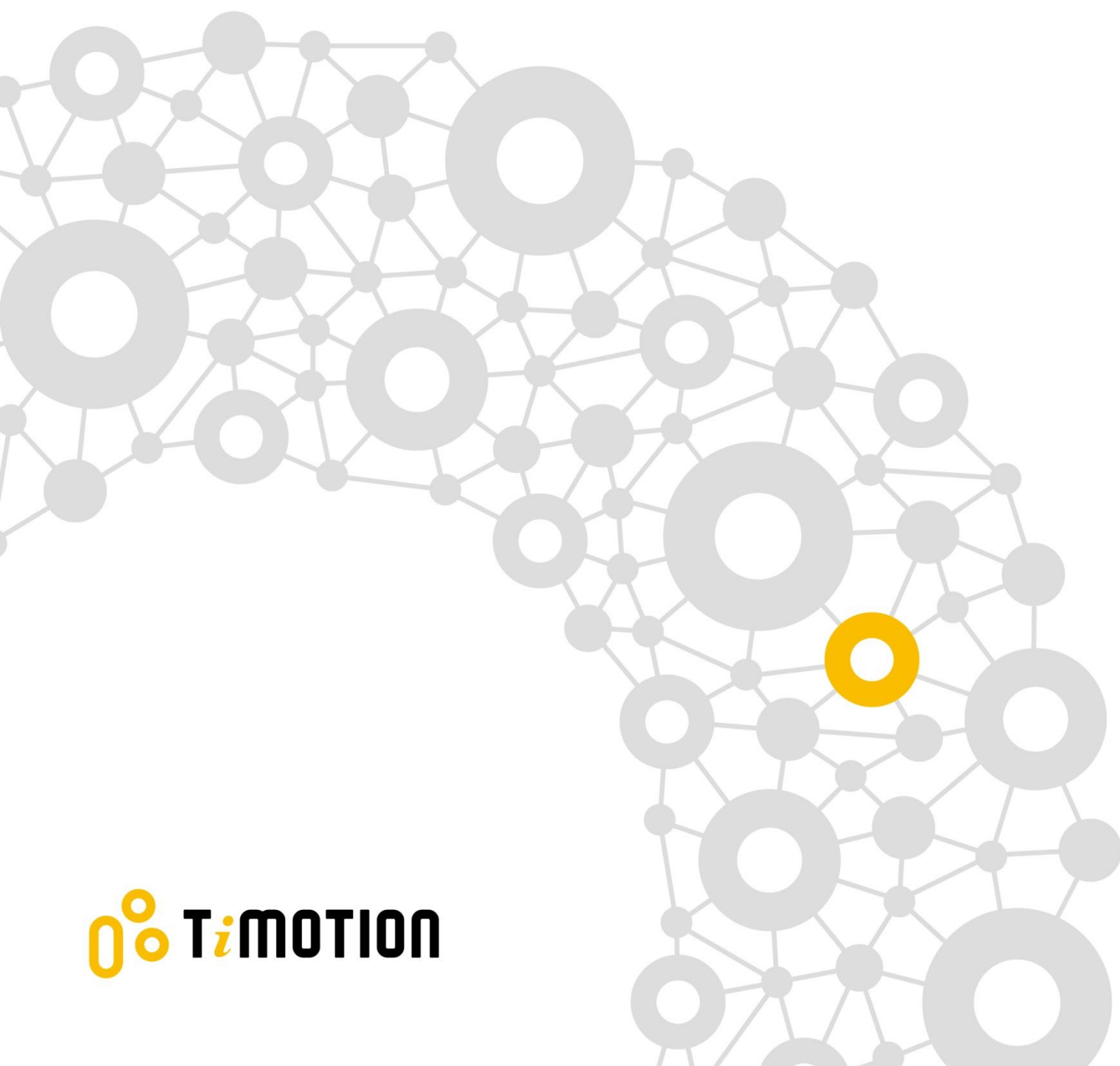


User Manual

VN3



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Glossary

The following table lists the specific terms and acronyms that are used in this document.

AWG	American wiring gauge. The smaller the number, the larger the diameter.
C.	The common pin.
EOS	End of the stroke.
N.C.	The pin of the limit switch that is a normally closed circuit, only changing to open when the switch is triggered.
N.O.	The pin of the limit switch that is a normally open circuit, only changing to close when the switch is triggered.
RPM	Revolutions Per Minute.
V _{DC} +	The positive pole of power input.
V _{DC} -	The negative pole of power input.

1 General

1.1 About this Manual

This document provides comprehensive instructions for the installation, operation, and maintenance of the TiMOTION product, along with its technical specifications. It is intended primarily for equipment or system manufacturers rather than end users. Manufacturers should utilize the safety information contained herein to develop user guides for end-users.

It is imperative to thoroughly review each section of this document prior to unpacking, installing, or operating the equipment. Please heed all the warnings, cautions and notes outlined in this manual, and strictly adhere to the instructions provided to ensure safe and dependable operation.

1.2 Authorized Personnel

Installation, maintenance, and replacement of TiMOTION products should only be carried out by qualified mechanical and electrical professionals. It is essential to restrict access to these products to personnel who possess the necessary experience and knowledge. Unauthorized individuals should not handle or interact with the products.

1.3 Warranty

Unless otherwise specified, TiMOTION provides a 24-month warranty on all Industrial Motion actuators from the date of manufacturing. It's important to note that this warranty remains valid only under the condition that the equipment is appropriately maintained and operated in accordance with these instructions. The suitability of the product for any particular use or purpose is the responsibility of the buyer and the user. TiMOTION does not provide any representation or warranty regarding the product's suitability for specific uses or purposes.

1.4 Support

Should you require any technical support or additional information regarding the product, please contact TiMOTION. For product or contact information, kindly visit <https://www.TiMOTION.com>

1.5 Disclaimer

This document has been generated based on TiMOTION's current technical knowledge. TiMOTION is continually updating product information and reserves the right to make technical modifications.

2 Safety

- ◆ Please read the notifications and warnings thoroughly before performing any work on equipment in which the TiMOTION actuator is incorporated.
- ◆ Please adhere to all the information contained in this document and on the product label.
- ◆ The actuator should only be operated according to its intended use. DO NOT misuse it for other lifting operations. If the user wishes to use the actuator for additional applications, please consult TiMOTION or its authorized dealer.

2.1 Notification and Warnings

2.1.1 Mounting or Dismounting

- ◆ Ensure the actuator is disconnected and not in operation.
- ◆ Ensure that no load is applied to the actuator that could be released during mounting or dismounting.
- ◆ Do not use the actuator if it appears faulty or damaged. Immediately notify TiMOTION so that corrective actions may be taken.
- ◆ Do not disassemble the actuator, as this may compromise its sealing and functionality. Any disassembly of the actuator will automatically void the warranty.
- ◆ Grease may be present on the extension tube. Contact with grease is non-hazardous. Please refrain from removing the film.

2.1.2 Before Operation

- ◆ Ensure that the actuator is correctly mounted as instructed in this document.
- ◆ Ensure that the equipment can operate unobstructed throughout the actuator's entire working area.
- ◆ Ensure that the actuator is properly connected to a main power supply or transformer, with the correct voltage specified on the actuator label.
- ◆ Ensure that the connection bolts are securely fastened and capable of withstanding wear.
- ◆ Ensure that the actuator is used only within its specified working limits.

2.1.3 During Operation

- ◆ Immediately Stop the actuator immediately if anything unusual is observed. Contact TiMOTION so corrective actions can be taken.
- ◆ Please refrain from unplugging any cables or connectors during operation or while power is applied.

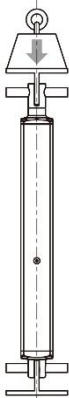
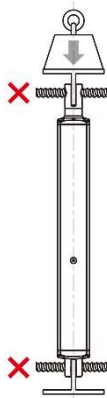
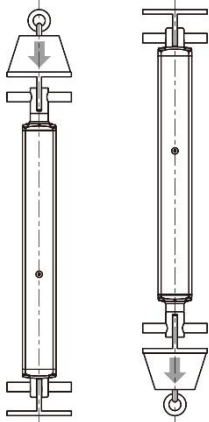
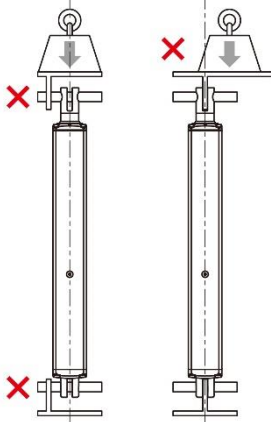
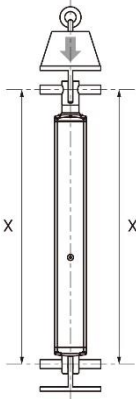
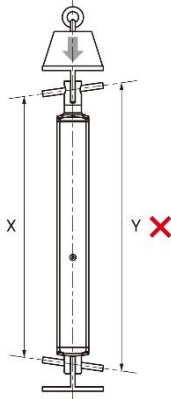
2.1.4 Power Off

- ◆ Ensure that the main power supply is properly switched off to prevent any unintentional operation.
- ◆ Please regularly check for extraordinary wear or abnormal wear.

3 Installation

3.1 Mechanical Installation

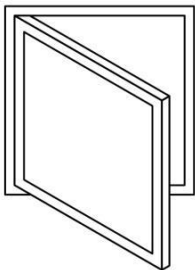
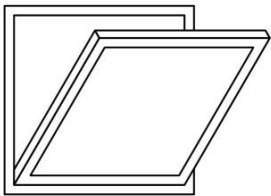
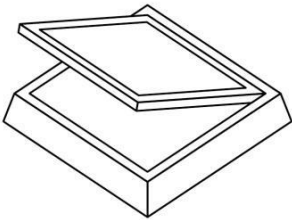
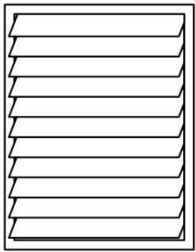
3.1.1 Important Notice

Note	Correct	Wrong
Please mount the actuator with unthreaded mounting pins in the correct dimension, and support them properly at both ends of the attachments.		
<u>Do not</u> mount the actuator with pins in different orientations, as this will apply stress on the nut during operation. Please note that the load should be pushed or pulled along the stroke axis of the actuator. Off-center or side loads can cause the actuator to bend and lead to failure.		
Be sure the mounting pins are parallel to each other. If the pins are not in parallel, the actuator can be bent and subsequently damaged.		

3.1.2 Crush and Shear Protection

To avoid injuries from entrapment, crush and shear points between the casement and the frame must be installed and secured at a height of 2.5 meters above the floor with the appropriate measures. This can be achieved by using contact-based or contactless protective devices against entrapment, which stop the motion of the window when it comes in contact with a person or an object. At a force higher than 150 Newtons at the main closing edge, the motion must stop within 20 millimeters. Make sure a warning symbol is added on the opening element to indicate this clearly.

The table below displays the possible crush and shear points on different types of windows:

			
Side-hung	Bottom-hung	Roof windows	Louver windows

3.1.3 Unintentional Opening or Independent Falling Prevention

Casements need to be hinged or secured in such a way that when the mounting elements fail, it will not fall down or move in an uncontrolled manner. To ensure the window will not slam shut, it is advised to use double suspensions, safety scissor stays, or casement stays.

Tilting windows should also be equipped with safety scissor stays or similar devices to avoid damages and risks of injury for persons through improper installation and operation. The safety scissor stays must be adjusted to the stroke of the actuator to prevent window blocking during opening. The opening width of the safety scissors must be bigger than the actuator stroke.

3.2 Electrical Installation

3.2.1 Important Notice

- ◆ Ensure that the leads or cables leading to the motor are rated to handle the maximum current.
- ◆ It is highly recommended to install an emergency stop to reduce the chance of a crushing hazard.

- ◆ If a DC motor is used without soft stop, it will experience a short peak of high voltage from the power supply. Therefore, when selecting power supplies, please ensure it can withstand this peak of high voltage.
- ◆ To minimize the chance of interference, avoid placing signal cables along power cables.
- ◆ Use shielded signal cables for applications sensitive to, or at risk of interference.
- ◆ Please note that using long cables in combination with small lead cross-sections and low voltages can cause malfunctions due to voltage drop.
- ◆ Utilize spark protection on relays and other coil-operated devices.
- ◆ Ensure that the power to the actuator is switched off before performing any work on the wiring.

3.2.2 Inrush Current

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

Ensure that the power supply is appropriately sized to handle the inrush current. (Note: batteries typically have no issue handling the inrush current.) Additionally, verify that all contacts, switches, and relays are adequately sized to manage the inrush current.

3.3 Wiring Definition

This section defines the standard wiring configuration of the actuator. For customized wiring options and details, please contact TiMOTION for more information.

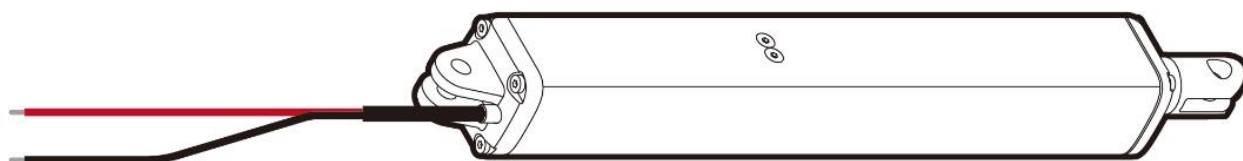
In general, the VN3 cable has a maximum of 6 pins – 2 power wire pins and up to 4 signal wire pins. The table below displays the available selections of different functions of limit switches with corresponding output signals.

Function of Limit Switches	Output Signal	
	Without	Hall sensor*2
Two Limit Switches Cut Off the Actuator at EOS	Y 3.3.1	Y 3.3.2
Two Limit Switches Send Signal at EOS	Y 3.3.3	N

Y = Selectable; N = Not compatible

3.3.1 Two Limit Switches Cut Off the Actuator at EOS (without Output Signal)

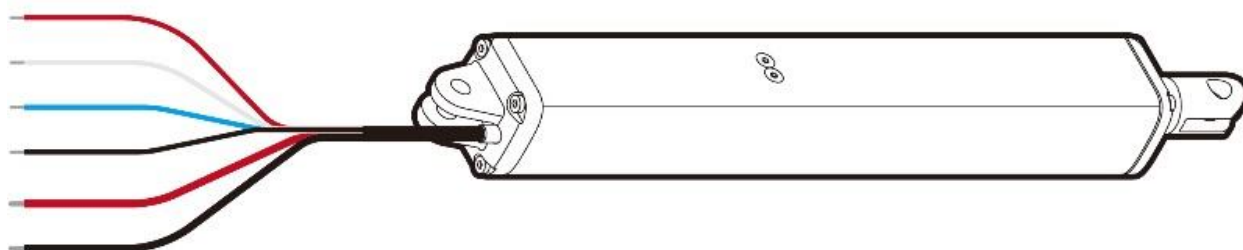
The actuator is equipped with two limit switches that cut off the actuator when the nut reaches the end of stroke.

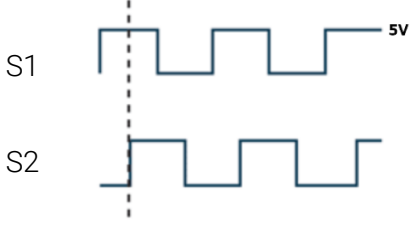


Wire	AWG	Description	Specification
Red	20	Connect to V_{DC+} to extend the actuator. Connect to V_{DC-} to retract the actuator.	24V DC version: input voltage 18~32V DC 12V DC version: input voltage 9~16V DC
Black	20	Connect to V_{DC-} to extend the actuator. Connect to V_{DC+} to retract the actuator.	

3.3.2 Two Limit Switches Cut Off the Actuator at EOS (with Two Hall Sensors for Output Signal)

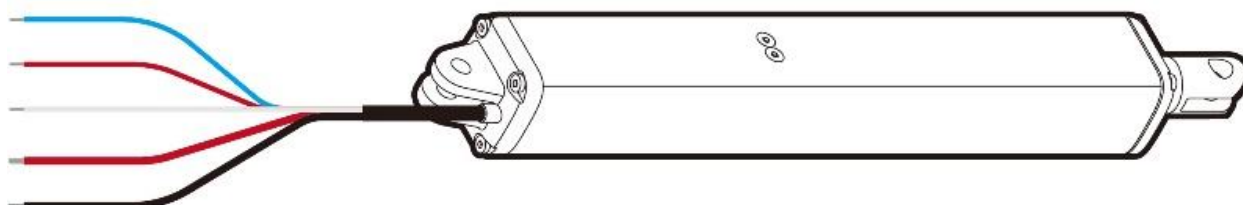
The actuator is equipped with two limit switches that cut off the actuator when the nut reaches the end of stroke, along with two Hall sensors for position signal output.



Wire	AWG	Description	Specification
Red	20	Connect to V_{DC+} to extend the actuator. Connect to V_{DC-} to retract the actuator.	24V DC version: input voltage 18~32V DC 12V DC version: input voltage 9~16V DC
Black	20	Connect to V_{DC-} to extend the actuator. Connect to V_{DC+} to retract the actuator.	
Red	26	+5V DC input signal power for Hall sensor board.	The Hall sensor output signal type is a square wave with a high voltage of 5V and a low voltage of 0V, with an output current <10mA. *Please refer to the approval drawing for the resolution and details. S1 leads a 90-degree phase to S2.  The Hall sensor circuit is independent to the motor power circuit.
White	26	Output Hall sensor signal S1 when the actuator is moving.	
Blue	26	Output Hall sensor signal S2 when the actuator is moving.	
Black	26	Hall sensor signal ground.	

3.3.3 Two Limit Switches Send Signal at EOS

The actuator is equipped with two limit switches that send signal when the nut reaches the end of stroke.



Wire	AWG	Description	Specification
Red	20	Connect to V_{DC+} to extend the actuator. Connect to V_{DC-} to retract the actuator.	24V DC version: input voltage 18~32V DC 12V DC version: input voltage 9~16V DC
Black	20	Connect to V_{DC-} to extend the actuator. Connect to V_{DC+} to retract the actuator.	
White	26	Connect to upper limit switch N.C. pin.	The signal is potential free and independent from the motor power circuit. Both the 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 V_{DC+} depends on the voltage of the actuator. Connect the limit switch signal with max <1A.
Blue	26	Connect to lower limit switch N.C. pin.	
Red	26	Connect to C.	

4 Troubleshooting

The table below lists symptoms that may appear during actuator operation, potential causes, and possible solutions. If the problem persists, please contact TiMOTION.

Symptom	Potential cause	Possible solution
The motor is running but the spindle is not moving.	The gear system or the spindle is damaged.	Contact TiMOTION.
No motor sound or movement.	The actuator is not properly connected to the power supply and/or the external control unit.	Check the connection to the power supply and/or the external control unit.
	Blown fuse.	Check the fuse.
	The cable is damaged.	Contact TiMOTION.
Excessive power consumption.	Misalignment or overload in the application.	Align the load properly or reduce the load. Try running the actuator without load.
The actuator cannot lift the selected load, or the motor runs too slowly.	Insufficient voltage from power supply.	Make sure the power supply is properly connected. Check the power supply, make sure the input voltage is within the rated range.
	The load is higher than the rated value.	Reduce the load.
No signal or incorrect feedback output.	The cable is damaged.	Contact TiMOTION.
	The cable is not connected properly.	Check the wiring. See 3.3 <i>Wiring Definition</i> for detailed information.
	The signal is constantly too high or too low in relation to the actual position.	Run the actuator to full extension or retraction.
The actuator runs in small steps.	Insufficient voltage from power supply.	Make sure the power supply is properly connected. Check the power supply, make sure the input voltage is within the rated range.
	The load is higher than the rated value.	Reduce the load.
The actuator cannot hold the selected load.	The load is higher than the rated load.	Reduce the load.

5 Maintenance

5.1 Packaging

The standard packaging for orders includes the product along with a QR code that directly links to this document. However, for orders of large quantities, the packaging may vary. Please be aware that packaging is subject to change at the sole and exclusive discretion of TiMOTION.

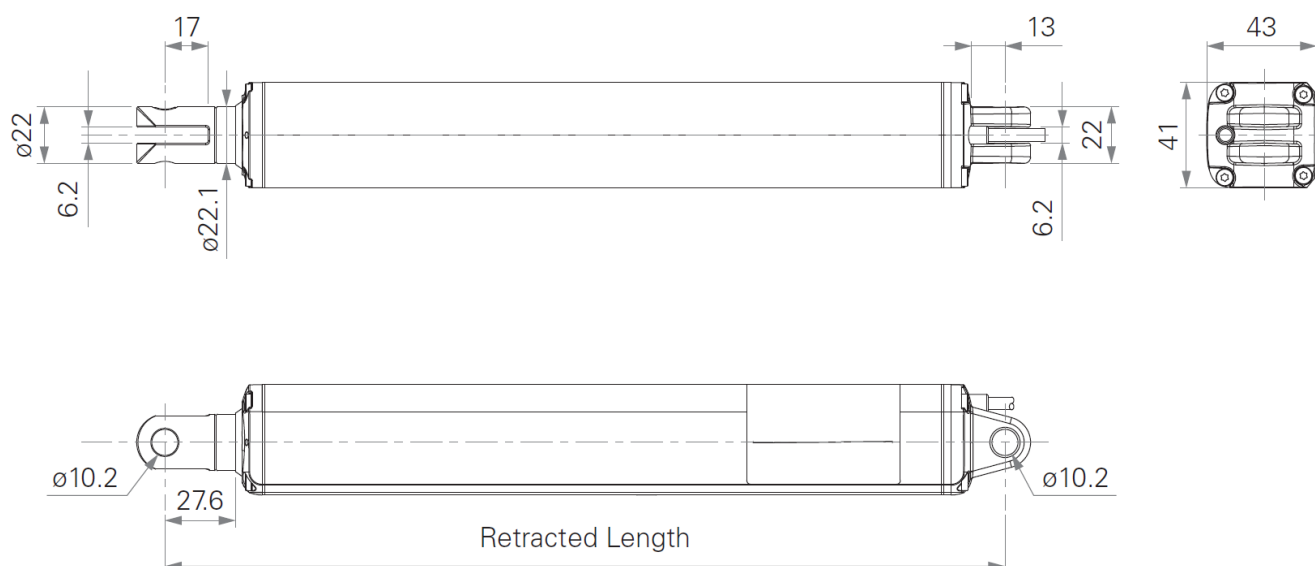
5.2 Transport and Storage

The actuator should only be transported and stored in its original TiMOTION packaging. The temperature range during transportation and storage should be between -40°C to +85°C (-40°F to +185°F). Please avoid subjecting the package to shock or impact. In case the package is damaged, inspect the actuator for visible damage and promptly notify both the carrier and TiMOTION.

6 Specifications

6.1 Dimensional Drawings

Unit: mm



6.2 Ordering Key

VN3 Ordering Key

VN3



Version: 20231206-E

Voltage	1 = 12V DC	2 = 24V DC	3 = 12V DC, thermal switch 4 = 24V DC, thermal switch
Load and Speed	See page 2		
Stroke (mm)	See page 2		
Retracted Length (mm)	See page 5		
Rear Attachment (mm)	1 = Aluminum, U clevis, slot 6.2, depth 13, hole 6.2 3 = Aluminum, U clevis, slot 6.2, depth 13, hole 10.2 2 = Aluminum, U clevis, slot 6.2, depth 13, hole 8.2		
See page 6			
Outer Tube Adjustable Clamping Block	0 = Without (Option when choosing rear attachment #1, #2, #3)		
Mounting Bracket	0 = Without (Option when choosing rear attachment #1, #2, #3)		
Front Attachment (mm)	1 = Aluminum, U clevis, slot 6.2, depth 17, hole 6.2 3 = Aluminum, U clevis, slot 6.2, depth 17, hole 10.2 2 = Aluminum, U clevis, slot 6.2, depth 17, hole 8.2		
See page 6			
Direction of Rear Attachment (Counterclockwise)	2 = 0°		
Color	0 = Standard		
IP Rating	1 = Without	2 = IP54	3 = IP66
Special Function of Spindle Subassembly	0 = Without (Standard) 1 = Safety nut		
Function of Limit Switches	1 = Two micro switches cut off the actuator at end of stroke 3 = Two micro switches send signal at end of stroke		
Output Signal	0 = Without 2 = Hall sensor * 2		
See page 6			
Connector	1 = DIN 6P, 90° plug 2 = Tinned leads		
See page 6			
Cable Length (mm)	0 = Without	2 = 1000	4 = 2000
	1 = 500	3 = 1500	5 = 5000

4

**TiMOTION consistently updates the features of its products to meet customer needs. For the latest ordering key, please contact TiMOTION.