

User Manual

MA4



 **TimOTION**

Contents

Contents	2
Glossary	4
1. General	5
1.1 About this manual	5
1.2 Target Personnel.....	5
1.3 Warranty.....	5
1.4 Transport and storage	5
1.5 Packaging	6
1.6 Support.....	6
1.7 Disclaimer	6
1.8 Notification and warnings.....	6
1.8.1 Mounting/dismounting the actuator.....	6
1.8.2 Operation.....	6
1.8.3 Equipment power off	7
1.8.4 Duty cycle.....	7
1.8.5 Temperature.....	7
2. Installation	8
2.1 Mechanical installation.....	8
2.1.1 Mounting notice.....	8
2.1.2 Manual drive operation.....	9
2.1.3 Outer tube reed sensor adjustment	10
2.2 Electrical installation	11
2.2.1 Important notice	11
2.2.2 Cable	12
2.2.3 Inrush current	13
2.3 Wiring definition	14
2.3.1 Wiring definition in all functions.....	14
2.3.2 Two limit switches to cut off the actuator (without signal output).....	15
2.3.3 Two limit switches to send the signal	16
2.3.4 Two limit switches cut off the actuator and POT	17
2.3.5 Two limit switches to send signal and POT	18
2.3.6 Two limit switches and a single Hall sensor	20
2.3.7 Two limit switches send the signal and a single Hall sensor	21
2.3.8 Two limit switches and double Hall sensors.....	23
2.3.9 Two limit switches send the signal and double Hall sensors	25
2.3.10 T-Smart.....	27
3. PGMA Installation	30
3.1 Connection.....	30
3.2 Steps for cable replacement	31
3.3 Power.....	32
4. Product specifications	33

4.1	2D drawings.....	33
4.2	Ordering key.....	34
5.	Troubleshooting	35

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.
- **Hall-POT**: Hall Effect Potentiometer (Provides analog voltage feedback).
- **EOS**: End of Stroke.

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 -40 to +85° C (-40 to +185° 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

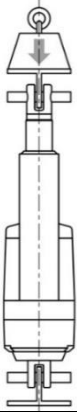
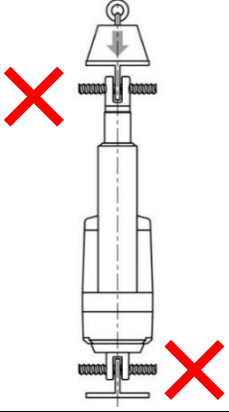
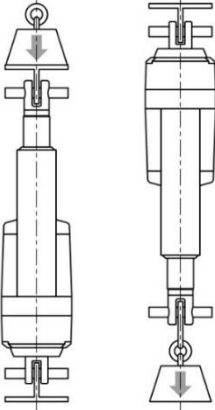
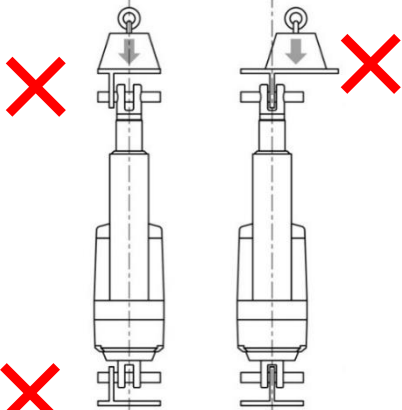
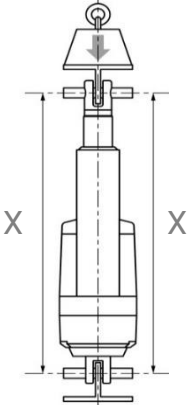
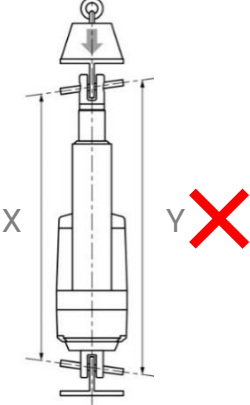
- ◆ The operating temperature range is $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$.
- ◆ The operational temperature range at full performance is $+5^{\circ}\text{C} \sim +45^{\circ}\text{C}$.

2. Installation

2.1 Mechanical installation

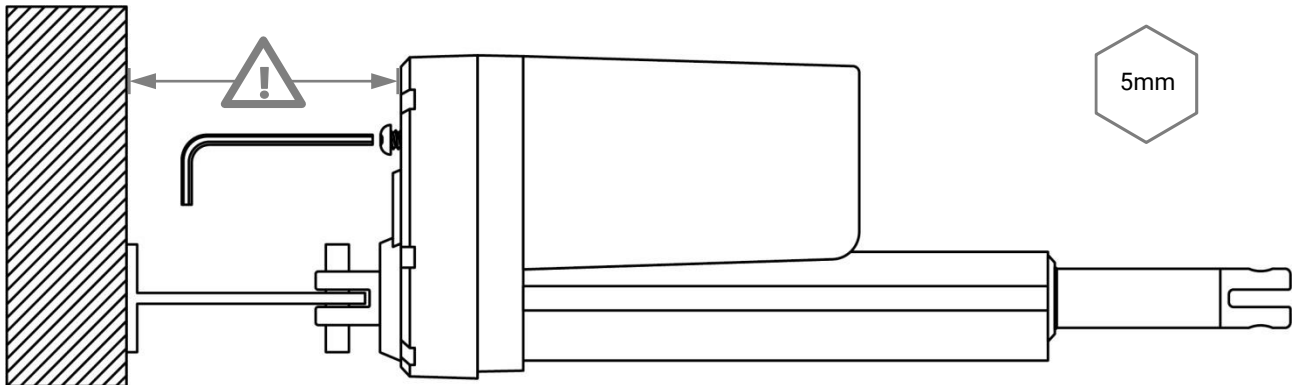
2.1.1 Mounting notice

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

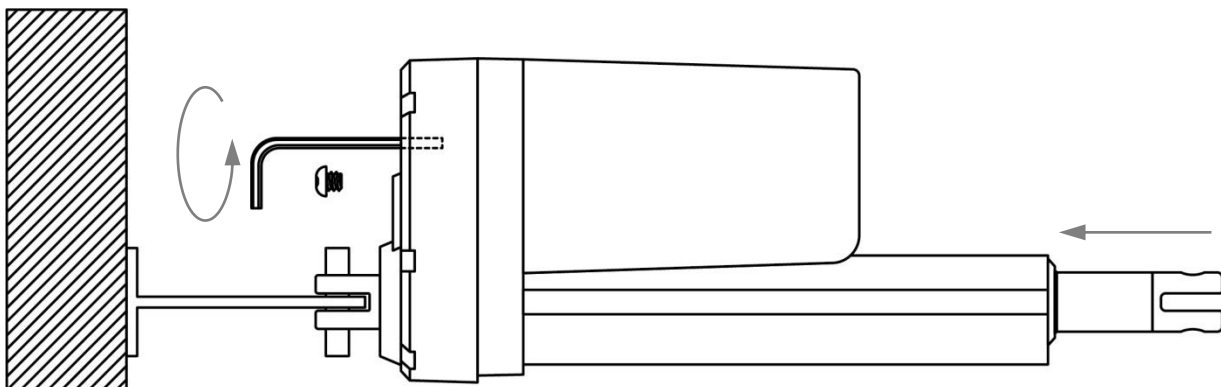
Note	Correct	Wrong
<p>Please mount the actuator with the mounting pins of correct dimension and without threaded at both ends of the attachments.</p>		
<p>Do not mount the actuator with the pins in different rotated angles, this could cause stress on the nut during operation.</p> <p>The load should act 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.</p>		
<p>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.</p>		

2.1.2 Manual drive operation

- ◆ In case of a power failure, a manual hand crank can be used.
- ◆ Before performing, the power supply needs to be disconnected.
- ◆ When mounting the actuator, ensure there is enough space between the rear adapter and any objects. This will allow the user override to be operated.
- ◆ Use the 5mm Allen key for both the IP protection screw and the manual drive shaft inside.

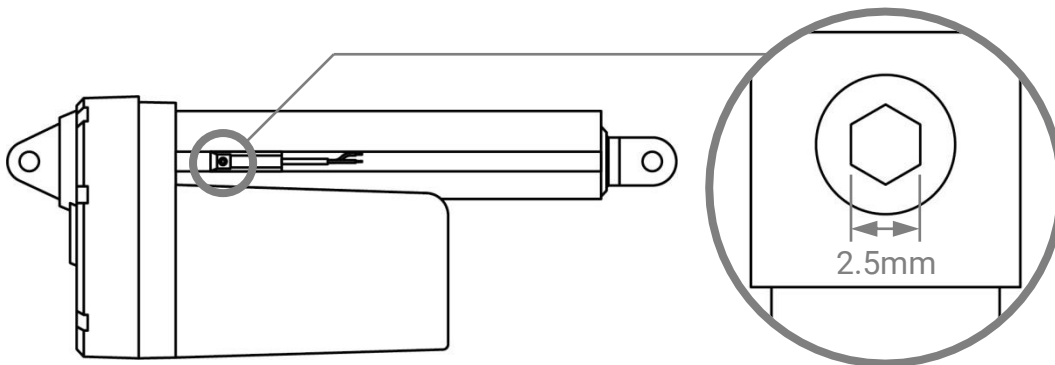


The torque required to manually move the extension tube is within 1.7 Nm, maximum 65 RPM. Please do not run the outer tube to the end of stroke, as that may damage the actuator.



2.1.3 Outer tube reed sensor adjustment

- ◆ The external limit switches are mounted in the two slots at the side of the cover tube.
- ◆ Use the 2.5mm Allen key inner hexagon to position and lock the reed sensor.
- ◆ Ensure the reed sensor doesn't meet other magnetic parts, as this may cause incorrect measurements.
- ◆ The torque required to secure the screw to fix the reed sensor is within 1.5 Nm
- ◆ The signal is potential free and independent from the motor power circuit.
- ◆ Connect the reed sensor with max 32V, <1A.
- ◆ The reed sensors are N.C..



2.2 Electrical installation

2.2.1 Important notice

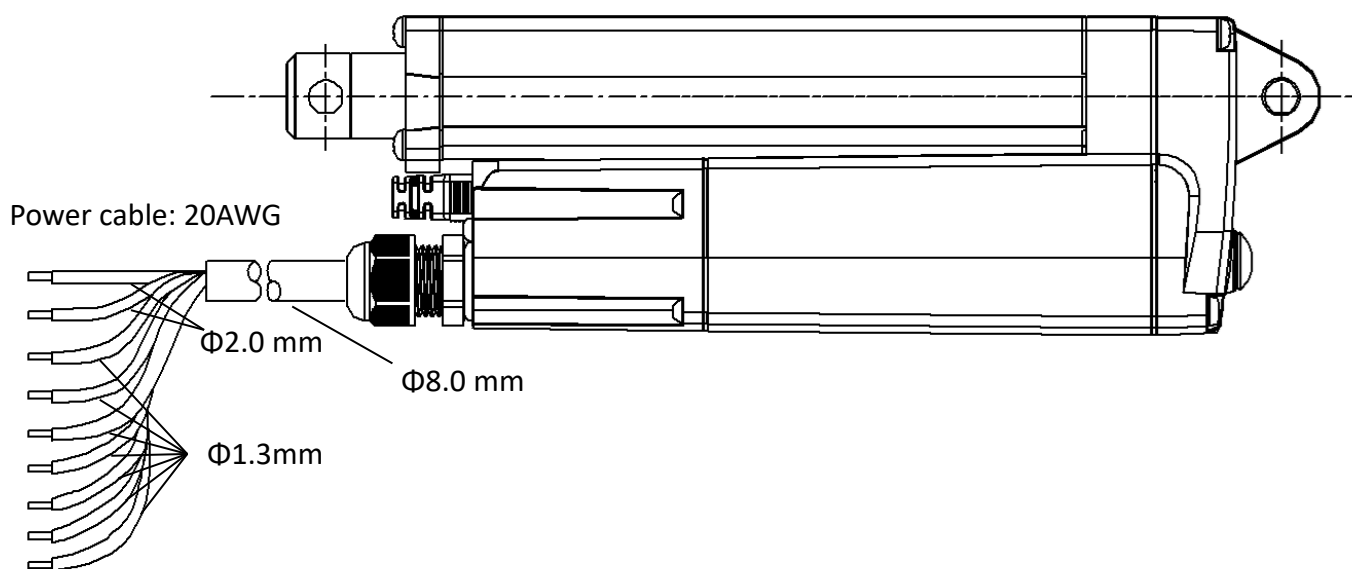
- ◆ Make sure the leads/cables leading to the motor are rated to handle the maximum current.
- ◆ To reduce the chance of a crushing hazard, we recommend an emergency stop.
- ◆ If you are not using soft stop on a DC-motor, a short peak of high voltage will be sent towards the power supply. When selecting 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 Cable

The actuator is supplied with a power cable (with/without signal wire). The standard cable, for industrial applications, has/have flying leads in the end for the user's equipment connections.

*Please refer to the approved drawing of any customized cable/connector.

Cable with signal:



Signal cable: 26AWG

2.2.3 Inrush current

When the actuator starts to work, there is an inrush current to the motor that will be less than 0.2 seconds (up to four times the rated current).

Please select a power supply that is able to withstand the inrush current. Also, all contacts, including switches and relay, should be chosen with caution.

2.3 Wiring definition

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

2.3.1 Wiring definition in all functions

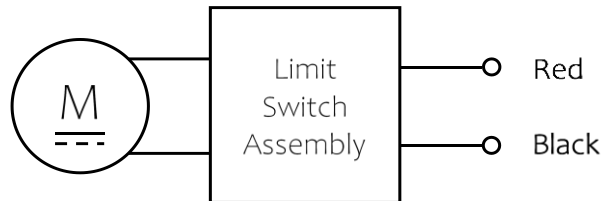
In general, the MA4 cable can have a maximum of 9 pins– (2 power wire pins and/or up to 7 signal wire pins) The function limitations for limit switches to output signals are shown in the table below:

Function	Signal output			
	Without	POT	Single Hall	Double Hall
2 limit switches to cut off the actuator	2.3.2	2.3.4	2.3.6	2.3.8
2 limit switches to send a signal	2.3.3	2.3.5	2.3.7	2.3.9
Function	Signal output (Please refer to T-Smart wire definition)			
T-Smart	2.3.10			

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

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

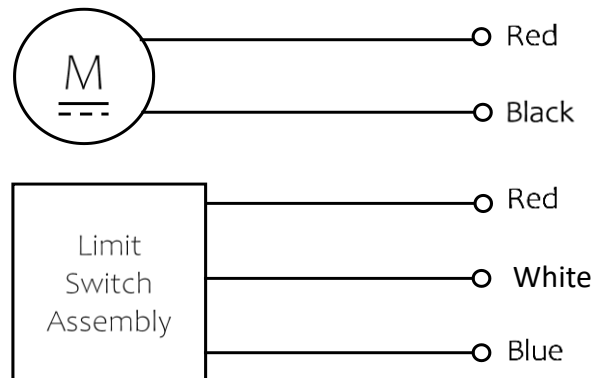
The actuator is equipped with two limit switches to cut off the motor when the actuator moves to the end of each stroke and without any output signal.



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

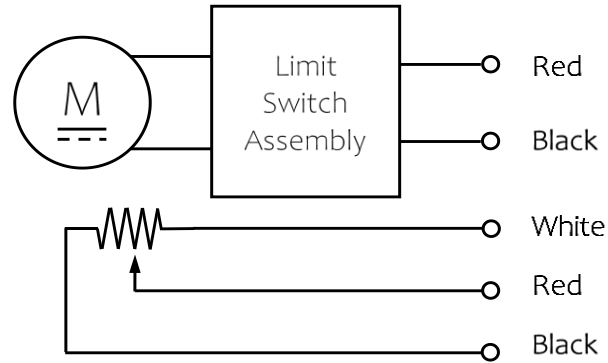
The actuator has two limit switches to send out the signal at fully extended or retracted stroke positions.

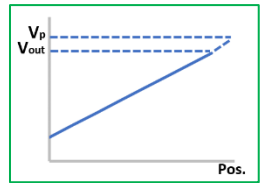


Wire	AWG	Description	Spec
Red	20	Connect to Vm+ to extend the actuator. Connect to Vm- to retract the actuator.	24V version: Input voltage 18~32 V DC. 12V version: Input voltage 9~16 V DC.
Black	20	Connect to Vm- to extend the actuator. Connect to Vm+ to retract the actuator.	
White	26	Connect to up 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 cut off the actuator and POT

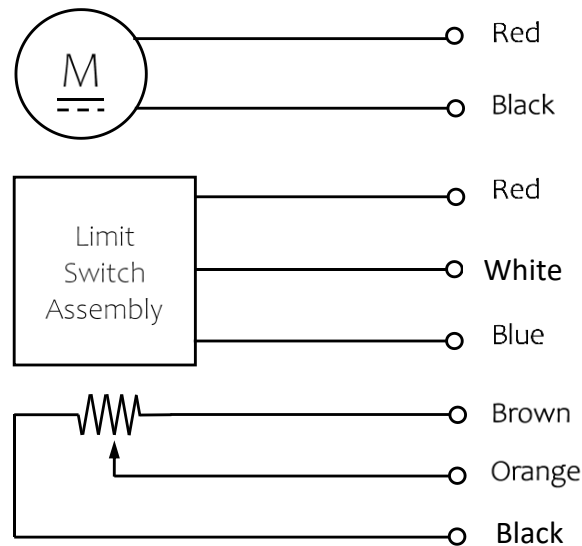
The actuator is equipped with two limit switches to cut off the motor when the actuator moves to the end of each stroke and has a POT position signal output.



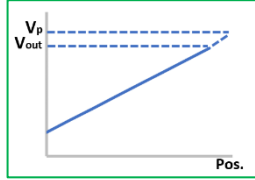
Wire	AWG	Description	Spec				
Red	20	Connect to Vm+ to extend the actuator Connect to Vm- to retract the actuator	24V version: Input voltage 18~32 V DC 12V version: Input voltage 9~16 V DC				
Black	20	Connect to Vm- to extend the actuator Connect to Vm+ to retract the actuator					
Black	26	POT signal ground.	POT output signal type is the voltage in proportion to the reference voltage input, which is relative to the position of the actuator.  The recommended power of the POT input is <2W. The brand and spec of the potentiometer embedded is Bourns, 0~10Kohm, 10 turns.				
Red	26	POT signal output $V_{out} = \{r(\Omega) / 10K(\Omega)\} V_p$ <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Fully retracted</th> <th>Fully extended</th> </tr> </thead> <tbody> <tr> <td>$r = 300 \sim 500(\Omega)$</td> <td>r depends on the configuration (note)</td> </tr> </tbody> </table> <p>Note: Users can refer to the drawing for fully extended resistance details.</p>		Fully retracted	Fully extended	$r = 300 \sim 500(\Omega)$	r depends on the configuration (note)
Fully retracted	Fully extended						
$r = 300 \sim 500(\Omega)$	r depends on the configuration (note)						
White	26	POT reference voltage input V_p , 5~32V DC (Recommended: 10V).					

2.3.5 Two limit switches to send signal and POT

The actuator has two limit switches to send out a signal at fully extended or retracted stroke positions and POT position signal output.

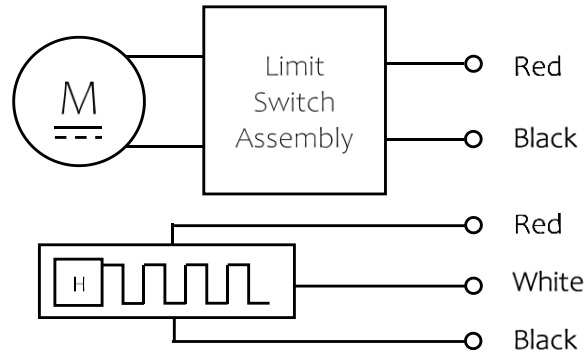



Wire	AWG	Description	Spec
Red	20	Connect to Vm+ to extend the actuator Connect to Vm- to retract the actuator	24V version: Input voltage 18~32 V DC 12V version: Input voltage 9~16 V DC
Black	20	Connect to Vm- to extend the actuator Connect to Vm+ to retract the actuator	
White	26	Connect to up limit 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 normal close circuits when the actuator is in the middle of a 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	

Black	26	POT signal ground.	POT output signal type is the voltage in proportion to the reference voltage input, which is relative to the position of the actuator.  The recommended power of the POT input is <2W.				
Orange	26	POT signal output $V_{out} = \{r(\Omega) / 10K(\Omega)\} V_p$ <table border="1" data-bbox="359 432 904 651"> <tr> <td>Fully retracted</td> <td>Fully extended</td> </tr> <tr> <td>$r = 300 \sim 500(\Omega)$</td> <td>r depends on the configuration (note)</td> </tr> </table> <p>Note: Users can refer to the drawing for fully extended resistance details.</p>		Fully retracted	Fully extended	$r = 300 \sim 500(\Omega)$	r depends on the configuration (note)
Fully retracted	Fully extended						
$r = 300 \sim 500(\Omega)$	r depends on the configuration (note)						
Brown	26	POT reference voltage input V_p , 5~32V DC (Recommended: 10V).					

2.3.6 Two limit switches and a single Hall sensor

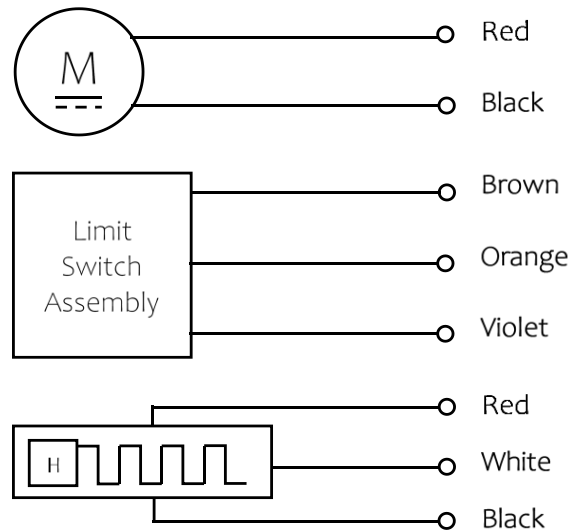
The actuator is equipped with two limit switches to cut off the motor when the actuator moves to the end of each stroke and with a single Hall sensor sending position signal output.




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 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.	

2.3.7 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.

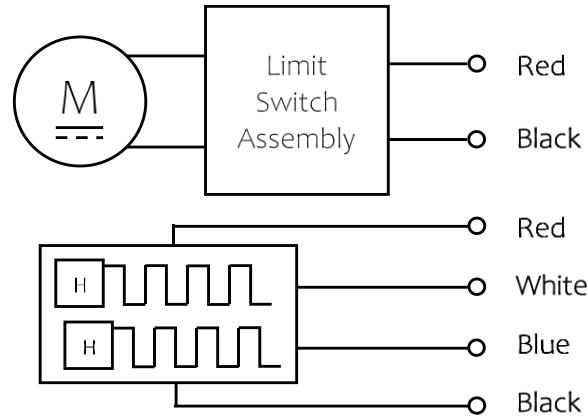


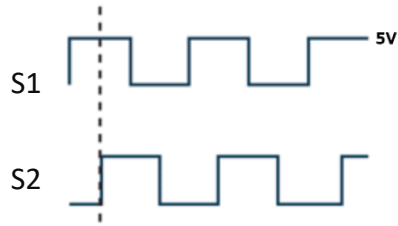
Wire	AWG	Description	Spec
Red	20	Connect to Vm+ to extend the actuator Connect to Vm- to retract the actuator	24V version: Input voltage 18~32 V DC 12V version: Input voltage 9~16 V DC
Black	20	Connect to Vm- to extend the actuator Connect to Vm+ to retract the actuator	
Red	26	+5V DC input signal power 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). 
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.

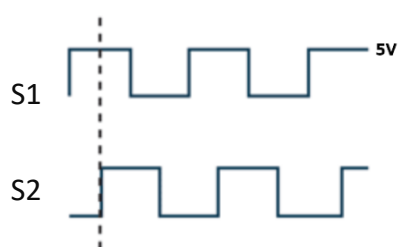
Orange	26	Connect to low limit switch normal open pin (N.O.)	<p>Both of the brown and orange signal wire are normal open circuit when the actuator is in the middle of the stroke.</p> <p>The signal circuit is connected to motor power circuit and the value V_{m+} depends on actuator voltage.</p> <p>Connect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

2.3.8 Two limit switches and double Hall sensors

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

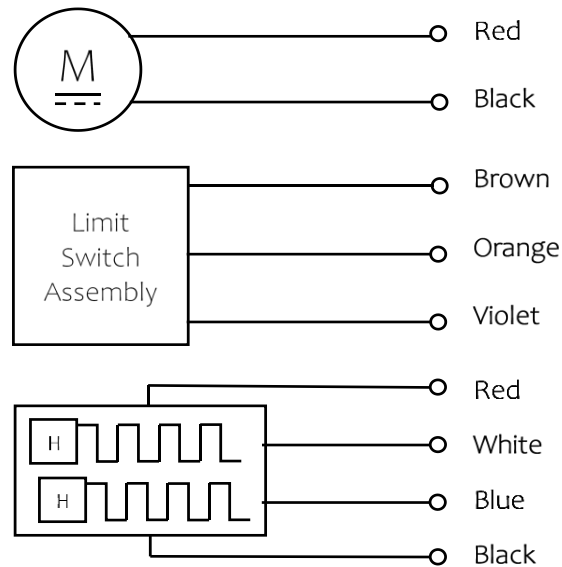


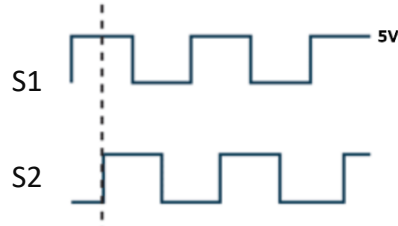
Wire	AWG	Description	Spec
Red	20	Connect to Vm+ to extend the actuator Connect to Vm- to retract the actuator	24V version: Input voltage 18~32 V DC 12V version: Input voltage 9~16 V DC
Black	20	Connect to Vm- to extend the actuator Connect to Vm+ to retract the actuator	
Red	26	+5V DC input signal power for Hall sensor board.	Hall sensor output signal type is 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 moves.	
Blue	26	Output Hall sensor signal S2 during the actuator moves.	
Black	26	Hall sensor signal ground.	

Wire	AWG	Description	Spec
Red	14	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	14	Connect to Vm- to extend the actuator Connect to Vm+ to retract the actuator	
Red	20	+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. 
White	20	Output Hall sensor signal S1 during the actuator moves.	
Blue	20	Output Hall sensor signal S2 during the actuator moves.	
Black	20	Hall sensor signal ground.	

2.3.9 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.

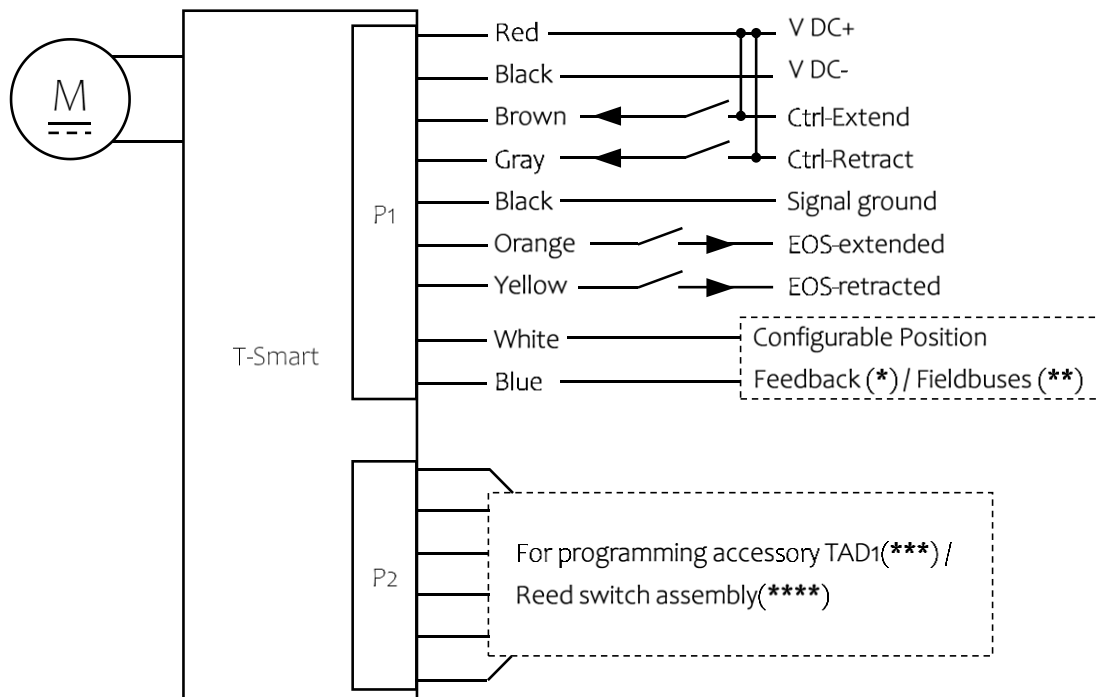


Wire	AWG	Description	Spec
Red	20	Connect to Vm+ to extend the actuator Connect to Vm- to retract the actuator	24V version: Input voltage 18~32 V DC 12V version: Input voltage 9~16 V DC
Black	20	Connect to Vm- to extend the actuator Connect to Vm+ to retract the actuator	
Red	26	+5V DC input signal power 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). 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.)	<p>The signal is potentially free and independent from the motor power circuit.</p> <p>Both brown and orange signal wires are normally closed circuits when the actuator is in the middle of the stroke.</p> <p>The signal circuit is connected to the motor power circuit, and the value V_{m+} depends on actuator voltage.</p> <p>Connect the limit switch signal wire to the load <1A.</p>
Orange	26	Connect to lower limit switch normal close pin (N.C.)	
Violet	26	Common wire	

2.3.10 T-Smart

The actuator is equipped with T-Smart PCBA, allowing position feedback (Single Hall, Double Hall, PWM, Hall-POT) and EOS feedback to PLC, Reed switch signal output to PLC or up to 8 actuators having synchronized function when actuators extended or retracted.

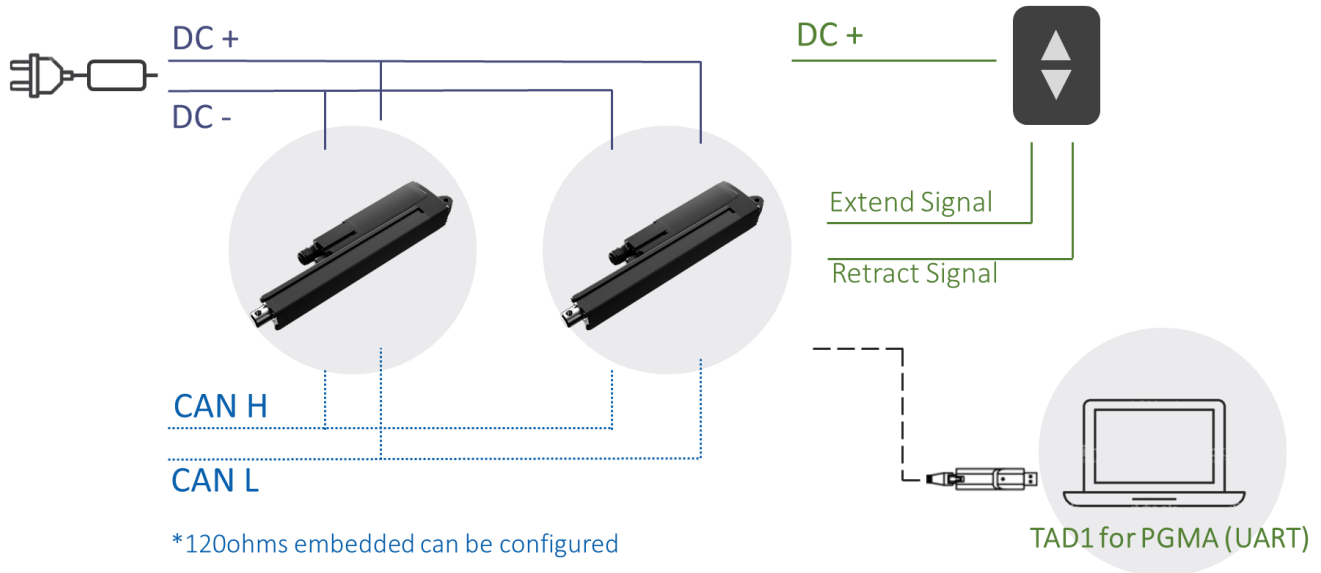


Port No.	Wire	AWG	Description	Spec
P1	Red	20	Connect Red to Vm+	24V version: Input voltage 18~34 V DC 12V version: Input voltage 9~16 V DC
	Black	20	Connect Black to Vm-	
	Brown	26	Extend the actuator when short circuit with Red	Input current: $\leq 1\text{mA}$
	Gray	26	Retract the actuator when short circuit with Red	

	Black	26	Signal ground	The signal is potentially free and independent from the motor power circuit.
	Orange	26	Connect to upper limit switch normal close pin (N.C.)	The yellow and orange signal wires are normally closed circuits when the actuator is in the middle of the stroke.
	Yellow	26	Connect to lower limit switch normal close pin (N.C.)	The signal circuit is connected to the motor power circuit, and the value V_{m+} depends on actuator voltage. Connect the limit switch signal wire to the load <1A.
	White	26	CAN High, Hall signal output_S1, Hall-POT signal output	For CAN High/Low: Voltage input = 5V Embedded 120 Ohms resistor for synchronized function.
	Blue	26	CAN Low, Hall signal output_S2, PWM signal output	For Hall and PWM signal output: Current output ≤ 5 mA For Hall-POT Configurable voltage output range = 0-10V Current output =10 mA
P2	Connector	NA	Connect TAD1 for programming Reed switch signal output	

Note:

1. If using a PLC, please contact your TiMOTION sales representative to determine the compatibility of T-Smart capable products with your desired communication protocol (e.g., CAN BUS or J1939).
2. Wire definition of two actuators in synchronized mode

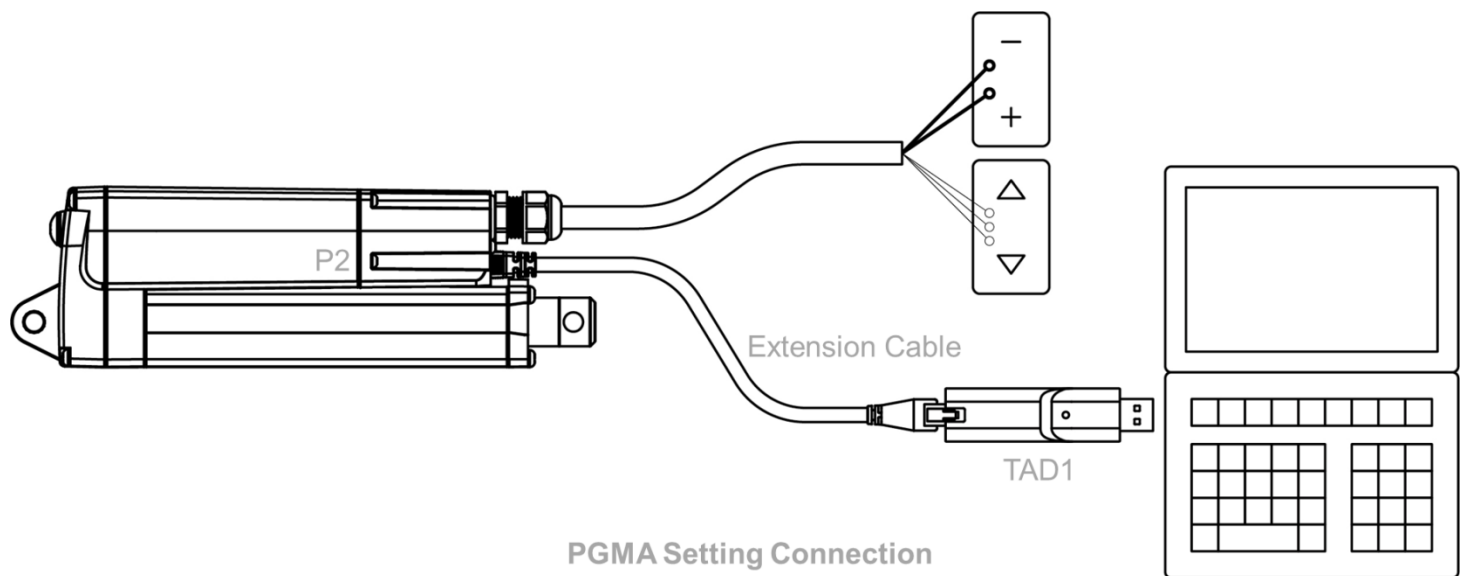


3. PGMA Installation

3.1 Connection

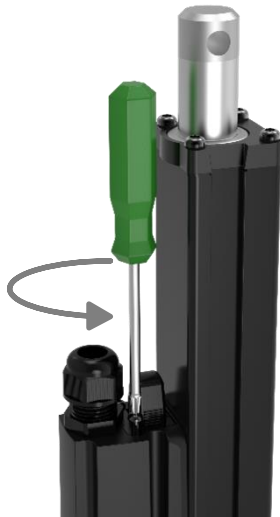
Unless the customer requests separate shipping, all cables will be fixed onto the actuator under the default installation procedure.

For PGMA settings, it is required to change the short circuit plug or the Reed sensor cable on P2. Either one needs to be replaced by a TAD1 extension cable.



3.2 Steps for cable replacement

This illustration shows how to replace the default installed P2 short circuit plug with the extension cables for the PGMA setting.



Step 1: Unscrew the cover.



Step 2: Remove the cover.



Step 3: Unplug the short circuit plug.



Step 4: Replace the TAD1 extension cable on P2.



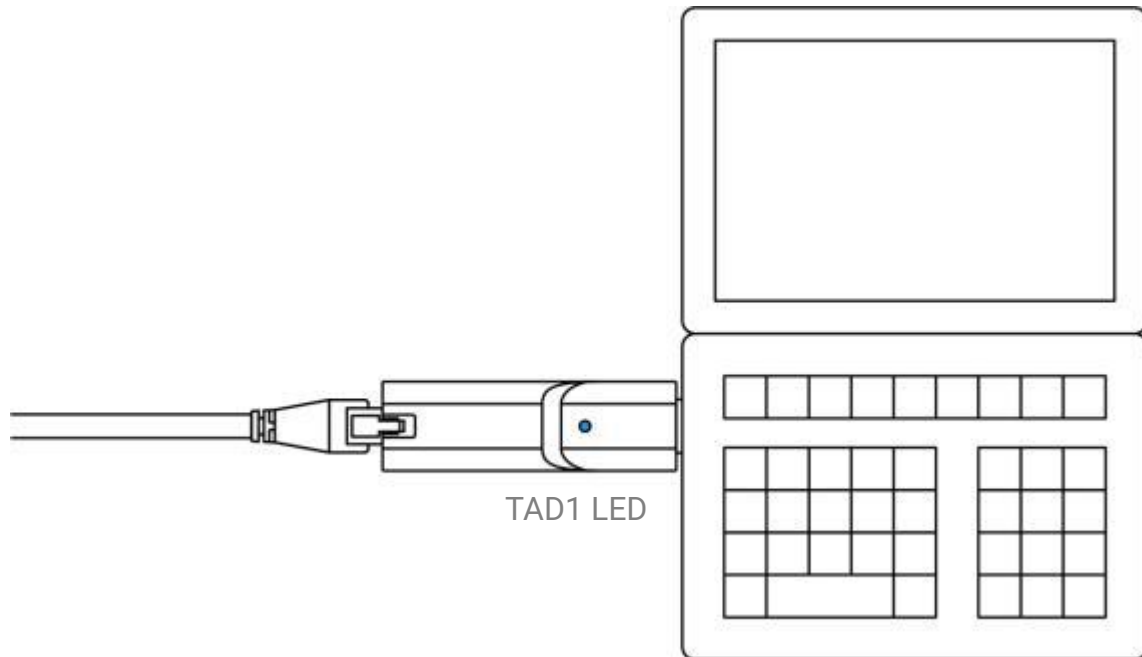
Step 5: Install the cover.



Step 6: Re-screw with the torque approximately 1.5Nm.

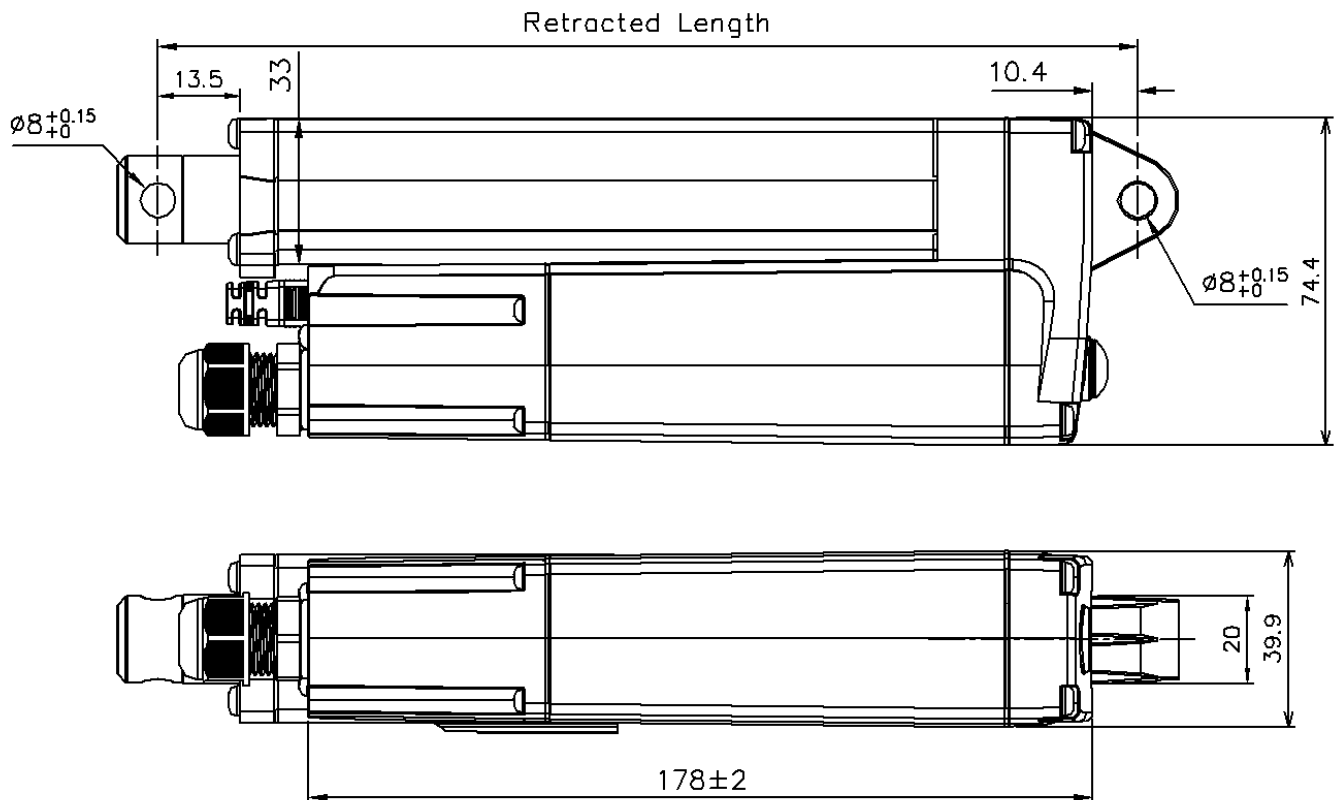
3.3 Power

1. Install the PGMA software on computers and close the program after completing installation.
2. Once the TAD1 extension cable is replaced, connect the TAD1 to the computer, the LED on the TAD1 will constantly shine, indicating a successful connection.
3. Connect the P1 cable to the DC power supply and turn on the power.
4. Execute PGMA.

















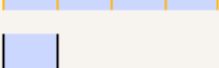



4. Product specifications

4.1 2D drawings



4.2 Ordering key

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

MA4		Version: 20210624-B	
	Version	N = Without T-Smart	T = T-Smart advanced
	Voltage	1 = 12V DC 2 = 24V DC	5 = 12V DC, thermal cutoff 6 = 24V DC, thermal cutoff
	Load & Speed	See page 2	
	Stroke (mm)	See page 2	
	Installation Length (mm)	See page 6	
	Rear Attachment (mm)	1 = Aluminum, slotless, hole 6.4mm 2 = Aluminum, slotless, hole 8.0mm 3 = Aluminum, slotless, hole 10.0mm See page 7	4 = Aluminum, U clevis, slot 6.1, depth 10.5, hole 6.4 5 = Aluminum, U clevis, slot 6.1, depth 10.5, hole 8.0 6 = Aluminum, U clevis, slot 6.1, depth 10.5, hole 10.0
	Front Attachment (mm)	1 = Aluminum, slotless, hole 6.4mm 2 = Aluminum, slotless, hole 8.0mm 3 = Aluminum, slotless, hole 10.0mm See page 7	4 = Aluminum, U clevis, slot 6.1, depth 16.0, hole 6.4 5 = Aluminum, U clevis, slot 6.1, depth 16.0, hole 8.0 6 = Aluminum, U clevis, slot 6.1, depth 16.0, hole 10.0
	Installation Direction (Counter-Clockwise)	1 = 0°	3 = 90° See page 8
	Functions for Built-in Limit Switches at End of Stroke	1 = Two limit switches cut off the actuator at end of stroke 2 = Two limit switches send signal at end of stroke (signal type: normally closed) T = Dedicated option for T-Smart (Two limit switches send signal at end of stroke to T-Smart PCBA)	
	Adjustable Reed Switch	0 = Without 1 = One reed switch with C = One reed switch for T-Smart	2 = Two reed switch with tinned leads D = Two reed switch for T-Smart
	Position Feedback	0 = Without 1 = Mechanical POT See page 9	4 = Hall sensor*1 5 = Hall sensor*2 T = Dedicated option for T-Smart
	IP Rating	1 = Without	6 = IP66 (dynamic) 9 = IP69K
	Cable Exit	T = 1+1: 1* cable with cable gland + Molex 6P socket	
	P1 Connector	G = tinned leads See page 8	
	P1 Cable Length	0000 = Without cable 0500 = 500	1000 = 1000 1500 = 1500 2000 = 2000
	P2 Connector	P = Dummy plug	
	P2 Cable Length	0000 = Without cable 0500 = 500	1000 = 1000 1500 = 1500 2000 = 2000
	Bus Interface	1 = Without	2 = CAN bus

5. Troubleshooting

Please find the table which lists the symptoms, possible causes, and recommend action.

If the problem could not be solved, please contact your TiMOTION sales representative.

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
The actuator cannot lift a full load, or the motor runs too slowly	Insufficient power supply	Check if 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 representative.
	Wrongly connected	Check the wiring
	The signal is constantly high/low	Run the actuator to full extension and retraction
		Reconnect the cables and set parallel configuration again
No signal or incorrect feedback output	Incorrect feedback output/level	Connect the actuator to PGMA and check for correct the feedback option
Actuator runs in smaller steps	Insufficient power supply	Check the power supply
	Load is higher than specified	Reduce the load
	Internal safety procedure activated	Connect the actuator to PGMA and check the following: <ul style="list-style-type: none"> Reason for last stop (detailed in

		PGMA user guide) <ul style="list-style-type: none"> Current cut-off levels in both directions
The actuator cannot hold the chosen load	The load is higher than specified	Reduce the load
Actuators do not move (Under parallel configuration)	The actuators are not properly connected to the power supply	<ul style="list-style-type: none"> Check the connection to the power supply and the external control unit (if any) Please make sure the power supply polarity is connected correctly; otherwise, you could damage the actuator
	Wrong number of actuators in the system	Check if the number of actuators in the system matches the sync setting in PGMA
	Communication wires are not properly connected	Check the parallel communication wires for all actuators
	Control signals extend/retract are not correctly connected	Check the wire connection on the control unit
	Position lost	Disconnect all cables, connect the actuators to PGMA one at a time and check the reason for the last stop Reconnect the cables and set parallel configuration again
Actuators cannot lift the full load (Under parallel configuration)	Insufficient power supply	Check the power supply while the actuator is running
	Overload in application	Reduce the load
		Connect actuators to PGMA one at a time and check the following: Type of chosen Parallel system Reason for last stop (page 60) Current cut-off levels in both directions Reconnect the cables and set parallel configuration again

Symptom	Possible cause	Action
Actuators run in smaller steps before stop (Under parallel configuration)	Insufficient power supply	Check the power supply while the actuator is running
		Connect the actuators to PGMA one at a time and check the following: Reason for last stop (page 62) Current cut-off levels in both directions
		After everything is connected, supply power to all actuators at the same time. Then wait 10 seconds before the Run In/Run Out signals are activated
Signal cable damaged or removed under operation (Under parallel configuration)	All actuators stop at the same position	The signal and power cables MUST be re-connected to all actuators. Ensure that no actuator is missing in the system. Otherwise, the system will not work, not even after re-powering Please see non-critical info below
		After everything is connected, put power on all actuators at the same time. Then wait 10 seconds before the Run In/Run Out signals are activated