

# Actuator MK83



MK83 is a lightweight intelligent actuator with a control board inside that can provide 750N thrust. The robust mechanism with high IP degree can work in harsh environment, and its size is suitable for limited installation space. There are multiple options for the built-in control board to suit different control platforms and various signal output requirements. MK83 is an advantageous choice for light load and short stroke applications in agriculture, construction and industrial automation.

# Content

<b>Features and Options</b>	<b>3</b>
<b>Usages</b>	<b>3</b>
<b>Control Options and Functions</b>	<b>4</b>
1. DXL options	4
2. Signal controls	4
<b>Performance Data</b>	<b>5</b>
<b>Dimensions</b>	<b>6</b>
1. Installation dimension	6
2. Drawing	6
3. Front connector type	6
4. Rear connector type	6
5. Connector orientation	7
6. Standard cable	7
<b>Wiring of control options</b>	<b>8</b>
1. Control option D0L	8
2. Control option DHL	9
3. Control option D+L	10
4. Control option DAL / DBL	12
5. Control option J00	13
<b>Ordering Key</b>	<b>15</b>

## Features and Options

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- Main applications: Agriculture, Construction and Industrial Automation.
- Input voltage: 12V DC / 24V DC
- Max. load: 750N (Push / Pull)
- Max. static load: 1500N (Push / Pull)
- Max. speed at no load: 15mm/sec (Typical value)
- Spindle type: ACME screw
- Stroke: 20~127mm
- Fixed built-in dimensions 245mm (Up to 345mm by request)
- Noise level:  $\leq 53$ dB
- IP level: IP66M, IPX9K
- Built-in stroke limit switches
- Various control options to suit the user's application
- Stainless steel extension tube
- Housing coating: Black, salt spray test for 500 hours.

## Usages

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- Duty cycle: Max. 20%, 2 min. continuous operation in 10 min.  
and is valid for operation within an ambient temperature of  $+5^{\circ}\text{C}\sim+40^{\circ}\text{C}$ )
- Operating ambient temperature:  $-40^{\circ}\text{C}\sim+85^{\circ}\text{C}$  (Full performance  $+5^{\circ}\text{C}\sim+40^{\circ}\text{C}$ )
- Storage ambient temperature:  $-40^{\circ}\text{C}\sim+100^{\circ}\text{C}$
- Relative humidity: Full performance from 20%~80% - non-condensing
- Atmospheric pressure: 700~1060hPa
- Height above mean sea level: Max. 3,000 meters



## Control Options and Functions

### 1. DXL options (Traditional DC control)

Directly swap the polarity of the input power to control the extension and retraction of the actuator. There is self-braking ability in limit switch position.

	D0L	DHL	D+L	DAL	DBL
Hall signal output <sup>(1)</sup>	-	✓	✓	-	-
Hall-POT output 0~10V	-	-	-	✓	-
Hall-POT output 0.5~4.5V	-	-	-	-	✓
EoS signal output <sup>(2)</sup>	✓	✓	✓	✓	✓

#### Notes:

- <sup>(1)</sup> The Hall feedback circuit of DHL option is NPN type; the Hall feedback circuit of D+L option is PNP type.  
<sup>(2)</sup> End of stroke signal output is not potential free.

### 2. Signal controls

Equipped with an H-bridge circuit to control the extension and retraction of the actuator. There is self-braking ability during the whole stroke.

	J00
Control platform	J1939 CAN bus
H-bridge <sup>(1)</sup>	✓
Soft start/stop	✓
Over current protection <sup>(2)</sup>	✓
Over voltage protection <sup>(3)</sup>	✓
Temperature protection <sup>(4)</sup>	✓
Low temp. response <sup>(5)</sup>	✓
Status feedback	✓
Current feedback	✓
Position feedback	✓
Speed / ramp feedback	✓
Error code feedback	✓

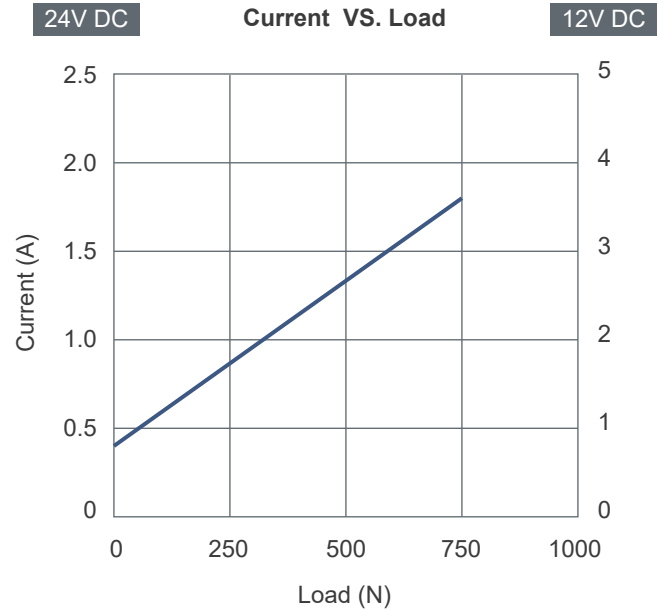
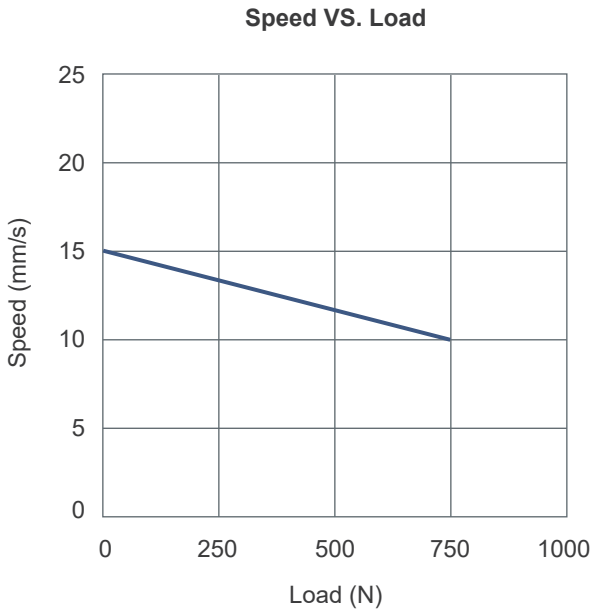
#### Notes:

- <sup>(1)</sup> The polarity of input DC power for the signal control options must be fixed and cannot be switched.  
<sup>(2)</sup> When the current detected reaching the following value: 5A @12V DC; 2.5A @24V DC and the time is accumulated to 300ms in a sampling period, actuator will be stopped automatically. Over current protection is only applicable in emergency situations. It should not be used for the normal routine stopping needs of the actuator, as this may damage the actuator.  
<sup>(3)</sup> The allowable input voltage is 9~16V @12V DC; 18~32V @24V DC, if it exceeds the range, actuator will be stopped automatically.  
<sup>(4)</sup> Temperature detection inside the actuator. When the detected temperature exceeds the operating range, actuator will be stopped automatically. It will resume operation until the temperature returns to a reasonable range.  
<sup>(5)</sup> When the temperature inside the actuator is detected below 0°C, the overcurrent protection setting value will be automatically increased by 30%, which will reduce the over current protection caused by low temperature.



## Performance Data

Model	Gear type	Push / Pull Max. (N)	Self-locking ability (N) <sup>(1)</sup>	Typical speed (mm/s) <sup>(2)</sup>		Typical current (A) <sup>(2)</sup>			
				No load	Full load	No load		Full load	
						24V	12V	24V	12V
MK83-XX-H2A-10	10	750	750	15	10	0.4	0.8	1.8	3.6



### Notes:

<sup>(1)</sup> The self-locking ability is in an short circuit states.

<sup>(2)</sup> The typical speed or typical current refers to an average value measured with a stable power supply and an ambient temperature of 20~25°C that is neither the upper limit nor the lower limit. The performance curves are made with typical values.

### ● Inrush current

- When the actuator starts, an inrush current of about 0.2 seconds will be generated. The starting inrush current of MK83 can reach 3 times of the maximum current under the rated load of the actuator.
- If a circuit board power supply is used, the specifications must be sufficient to handle the inrush current. If batteries are used as the power source, inrush current will not be a problem. Besides, the connectors, switches and relays selected by user must also be able to withstand the inrush current.

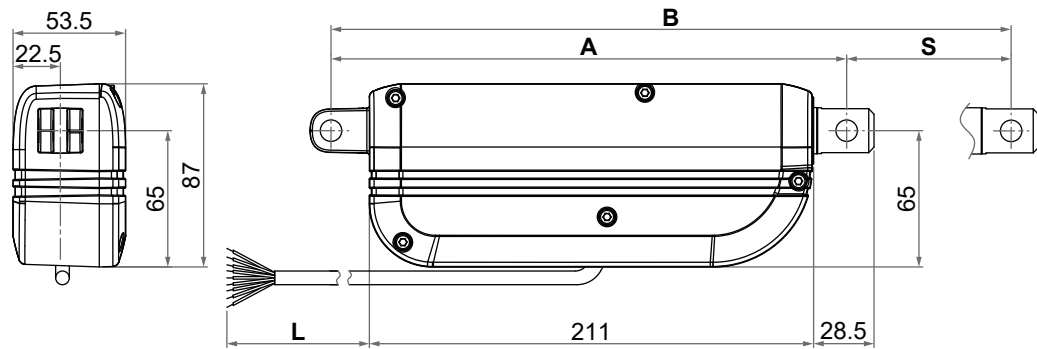


## Dimensions

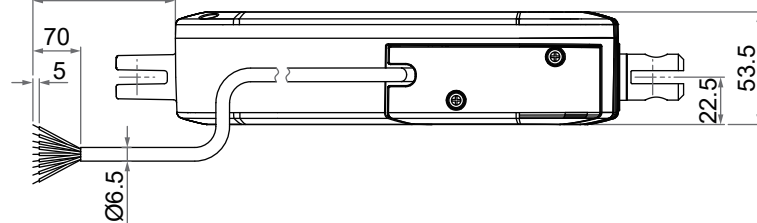
### 1. Installation dimension

- Available stroke (S) range = 20~127mm (±2mm)
- Retracted length (A) = 245mm (±2mm)  
Optional retracted length 246~345mm could be ordered. Please consult MOTECK sales for MOQ.
- Extended length (B) = Retracted length (A) + Stroke (S)

### 2. Drawing

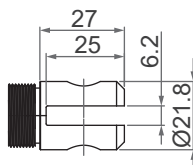
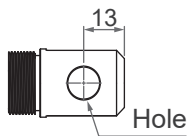


L: Cable length outside the actuator (Refer to Page 7)



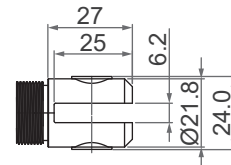
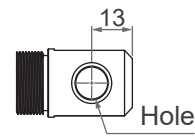
Unit: mm

### 3. Front connector type



5 : SUS304 slot, hole Ø10.2mm

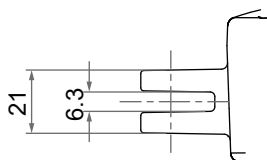
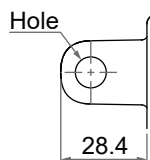
6 : SUS304 slot, hole Ø12.2mm



7 : SUS304 slot with bushings, hole Ø10.2mm

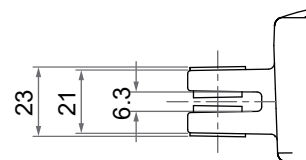
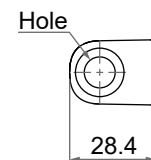
8 : SUS304 slot with bushings, hole Ø8.2mm

### 4. Rear connector type



1 : Metal slot, hole Ø10.2mm

2 : Metal slot, hole Ø12.2mm

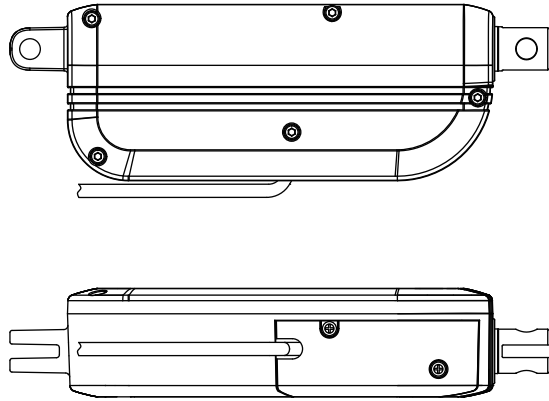


3 : Metal slot with bushings, hole Ø10.2mm

4 : Metal slot with bushings, hole Ø8.2mm



## 5. Connector orientation

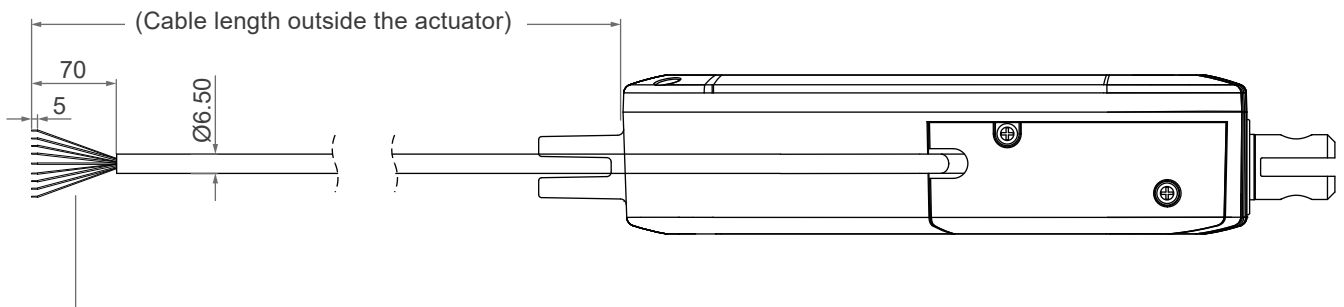


### Notes:

- (1) Front and rear connectors shown in standard 0°
- (2) Alignment of front and rear end holes: If the front end hole is not in the same direction as the rear end hole, the front end along with the inner tube must be rotated clockwise to the end, and then counterclockwise until it is aligned with the rear end hole. However, it should not be rotated more than 180°, otherwise the load capacity will be reduced.

## 6. Standard cable

Nominal cable length	Length outside the actuator
750 mm	705 mm
1500 mm	1455 mm
3000 mm	2955 mm



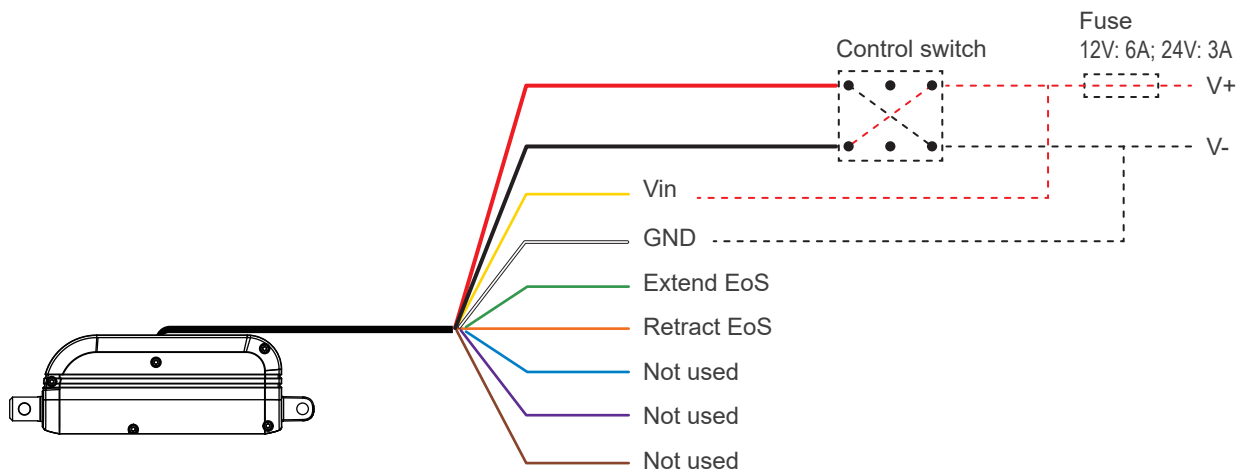
Wire color	Wire gauge
Red	18AWG
Black	18AWG
Brown	22AWG
Purple	22AWG
Blue	22AWG
Yellow	22AWG
White	22AWG
Green	22AWG
Orange	22AWG



## Wiring of control options

### 1. Control option D0L (DC control, with EoS signal output.)

#### • Wiring:



**Note:** All dashed lines are connected by the customer.

#### • Wire definitions:

Wire color	Definition	Description
Red	DC power	<ul style="list-style-type: none"> <li>Connect red wire to "V+" &amp; black wire to "V-" of DC power to extend the actuator. Switch the polarity of DC input to retract it.</li> <li>Input voltage: According to actuator voltage specification +/-10%</li> </ul>
Black		
Yellow	Vin	5~32V DC, same as V+ is recommended.
White	GND	Signal GND. For EoS output.
Green	Extend EoS output	<ul style="list-style-type: none"> <li>The EoS signal is an active-high signal, i.e. the signal output from low to high when the actuator reaches the limit switches.</li> <li>The min. Voltage when EoS signal goes to high=<math>V_{in}-2V</math></li> <li>EoS signal output is not potential free</li> </ul>
Orange	Retract EoS output	
Blue	Not used	
Purple	Not used	
Brown	Not used	

#### Notes:

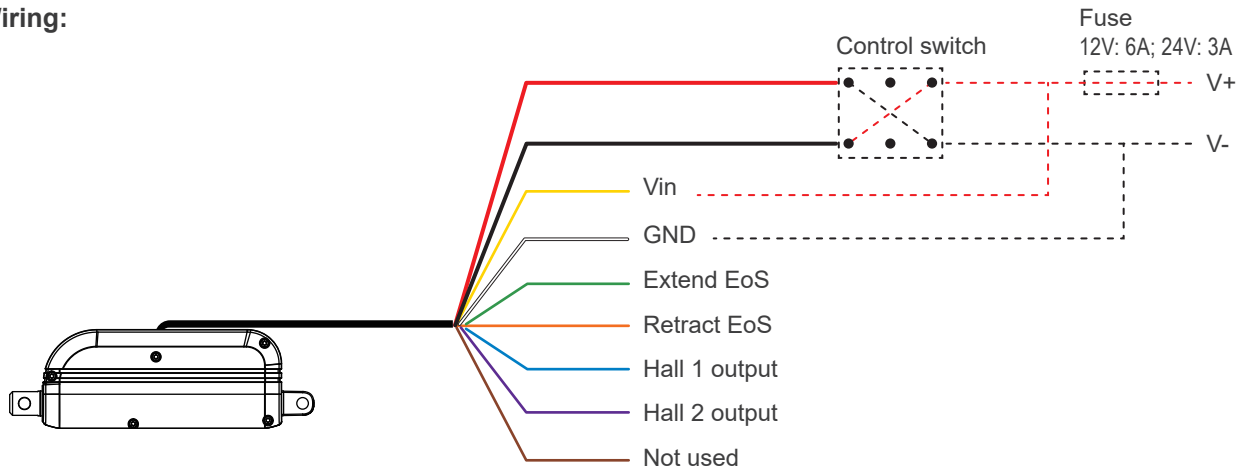
- (1) To use the EoS signal, you must keep the power supply of the actuator and the Vin power supply, otherwise the signal will be lost.
- (2) Please ensure that unused wires are well insulated to avoid damaging the internal circuit of the actuator.



## 2. Control option DHL


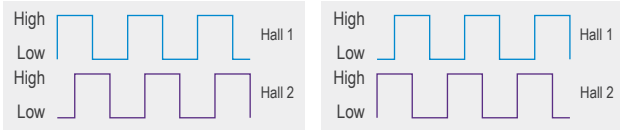
### (DC control, with EoS signal output and dual Hall effect sensors feedback-NPN type)

#### • Wiring:



**Note:** All dashed lines are connected by the customer.

#### • Wire definitions:

Wire color	Definition	Description								
Red	DC power	<ul style="list-style-type: none"> <li>Connect red wire to "V+" &amp; black wire to "V-" of DC power to extend the actuator. Switch the polarity of DC input to retract it.</li> <li>Input voltage: According to actuator voltage specification +/-10%</li> </ul>								
Black										
Yellow	Vin	5~32V DC, same as V+ is recommended.  If this voltage input must share the motor's power supply, be sure to use a separate power cord to draw power from the source, not tapping it from the control board's power input. Otherwise, the motor's inrush current will cause the Hall IC circuit to malfunction.								
White	GND	Signal GND. Both for Hall output and EoS signal.								
Green	Extend EoS output	<ul style="list-style-type: none"> <li>The EoS signal is an active-high signal, i.e. the signal output from low to high when the actuator reaches the limit switches.</li> <li>The min. Voltage when EoS signal goes to high=Vin-2V</li> <li>EoS signal output is not potential free</li> </ul>								
Orange	Retract EoS output									
Blue	Hall 1 output	Vout High min = Vin - 1.2V, I <sub>max</sub> 12.7mA Vout Low = GND Hall signal data: 								
Purple	Hall 2 output	Resolution: <table border="1"> <thead> <tr> <th>Motor and spindle type</th> <th>Gear type</th> <th>Pitch (mm)</th> <th>Resolution (pulses/mm)</th> </tr> </thead> <tbody> <tr> <td>H2A</td> <td>10</td> <td>2</td> <td>4.0</td> </tr> </tbody> </table>	Motor and spindle type	Gear type	Pitch (mm)	Resolution (pulses/mm)	H2A	10	2	4.0
Motor and spindle type	Gear type	Pitch (mm)	Resolution (pulses/mm)							
H2A	10	2	4.0							
Brown	Not used									

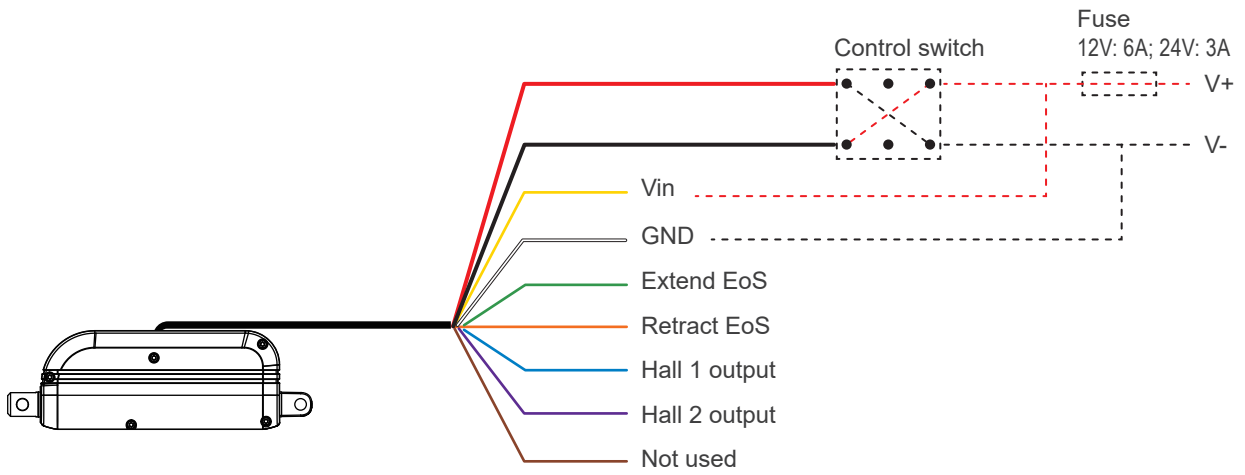
#### Notes:

- To use the EoS signal, you must keep the power supply of the actuator and the Vin power supply, otherwise the signal will be lost.
- Please ensure that unused wires are well insulated to avoid damaging the internal circuit of the actuator.



### 3. Control option D+L (DC control, with EoS signal output and dual Hall effect sensors feedback-PNP type)


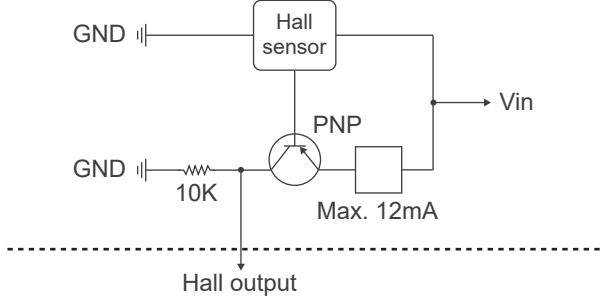
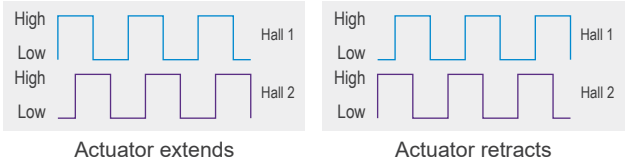
• Wiring:



**Note:** All dashed lines are connected by the customer.



• Wire definitions: D+L

Wire color	Definition	Description								
Red	DC power	<ul style="list-style-type: none"> <li>Connect red wire to "V+" &amp; black wire to "V-" of DC power to extend the actuator. Switch the polarity of DC input to retract it.</li> <li>Input voltage: According to actuator voltage specification +/-10%</li> </ul>								
Black										
Yellow	Vin	5~32V DC, same as V+ is recommended.  If this voltage input must share the motor's power supply, be sure to use a separate power cord to draw power from the source, not tapping it from the control board's power input. Otherwise, the motor's inrush current will cause the Hall IC circuit to malfunction.								
White	GND	Signal GND. Both for Hall output and EoS signal.								
Green	Extend EoS output	<ul style="list-style-type: none"> <li>The EoS signal is an active-high signal, i.e. the signal output from low to high when the actuator reaches the limit switches.</li> <li>The min. Voltage when EoS signal goes to high=Vin-2V</li> <li>EoS signal output is not potential free</li> </ul>								
Orange	Retract EoS output									
Blue	Hall 1 output	High = 10.8V (±0.6V), Source current max. 12mA Low = 10KΩ pull down (See internal circuit diagram) 								
Purple	Hall 2 output	Hall signal data:  Resolution: <table border="1" data-bbox="582 1473 1305 1545"> <thead> <tr> <th>Motor and spindle type</th> <th>Gear type</th> <th>Pitch (mm)</th> <th>Resolution (pulses/mm)</th> </tr> </thead> <tbody> <tr> <td>H2A</td> <td>10</td> <td>2</td> <td>4.0</td> </tr> </tbody> </table>	Motor and spindle type	Gear type	Pitch (mm)	Resolution (pulses/mm)	H2A	10	2	4.0
Motor and spindle type	Gear type	Pitch (mm)	Resolution (pulses/mm)							
H2A	10	2	4.0							
Brown	Not used									

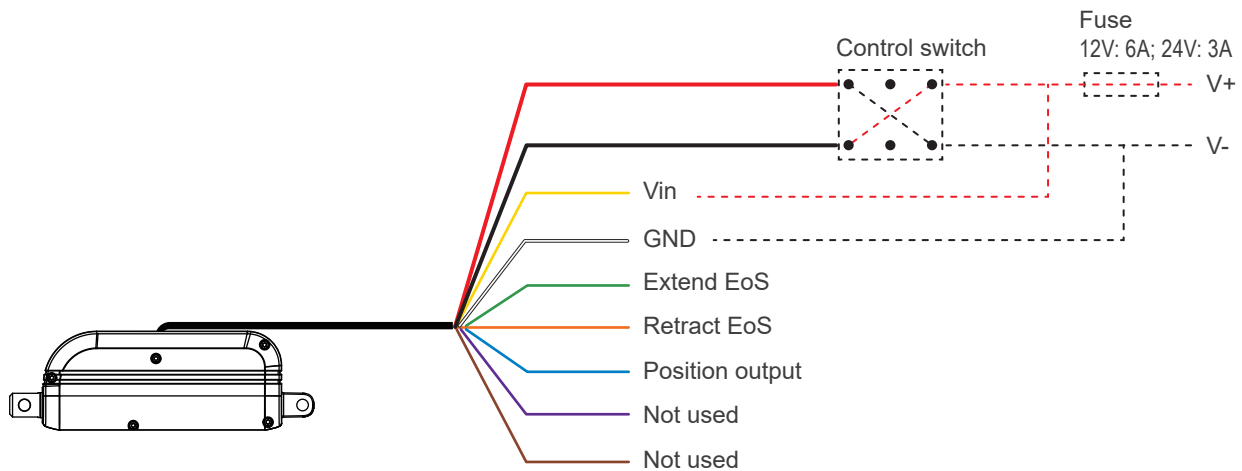
Notes:

- (1) To use the EoS signal, you must keep the power supply of the actuator and the Vin power supply, otherwise the signal will be lost.
- (2) Please ensure that unused wires are well insulated to avoid damaging the internal circuit of the actuator.




#### 4. Control option DAL / DBL (DC control, with EoS signal output and Hall-POT feedback)

##### • Wiring:



**Note:** All dashed lines are connected by the customer.

##### • Wire definitions:

Wire color	Definition	Description
Red	DC power	<ul style="list-style-type: none"> <li>Connect red wire to "V+" &amp; black wire to "V-" of DC power to extend the actuator. Switch the polarity of DC input to retract it.</li> <li>Input voltage: According to actuator voltage specification +/-10%</li> </ul>
Black		
Yellow	Vin	Input voltage: 10~30V @12V DC; 18~30V @24V DC, same as V+ is recommended.   If this voltage input must share the motor's power supply, be sure to use a separate power cord to draw power from the source, not tapping it from the control board's power input. Otherwise, the motor's inrush current will cause the Hall IC circuit to malfunction.
White	GND	Signal GND. Both for Position output and EoS signal.
Blue	Position output	<ul style="list-style-type: none"> <li>Position output is an analog output of the actuator position within the stroke range.</li> <li>Output range: DAL: 0~10V / DBL: 0.5~4.5V</li> </ul>
Green	Extend EoS output	<ul style="list-style-type: none"> <li>The EoS signal is an active-high signal, i.e. the signal output from low to high when the actuator reaches the limit switches.</li> <li>The min. Voltage when EoS signal goes to high=Vin-2V</li> <li>EoS signal output is not potential free</li> </ul>
Orange	Retract EoS output	
Purple	Not used	
Brown	Not used	

##### Notes:

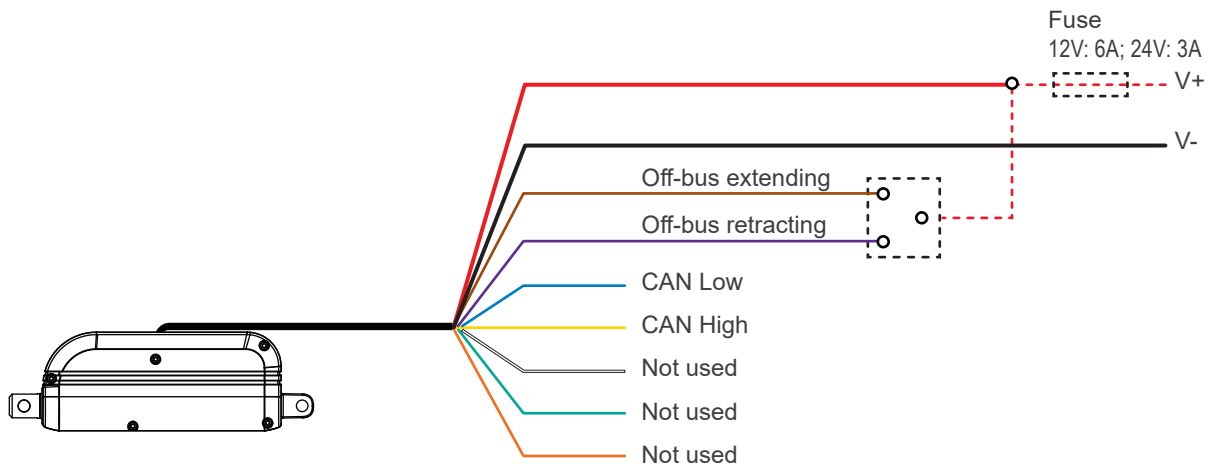
- To use the EoS signal, you must keep the power supply of the actuator and the Vin power supply, otherwise the signal will be lost.
- Please ensure that unused wires are well insulated to avoid damaging the internal circuit of the actuator.
- If the DAL/DBL control option detects that the Vin voltage is too low or there is a power failure, it will automatically save the current position of the actuator.



## 5. Control option J00 (CAN bus J1939 control system)

J00 option is designed for CAN bus platform, adopts the SAE J1939 communication protocol. The users who choose the J00 option must have established or prepared to establish the J1939 local area network control system to apply this actuator.

### • Wiring:



**Note:** All dashed lines are connected by the customer.

### • Wire definitions:

Wire color	Definition	Description
Red	V+	<ul style="list-style-type: none"> <li>• Connect Red to positive</li> <li>• Connect Black to negative</li> <li>• Do not swap the polarity</li> <li>• Input voltage: According to actuator voltage specification +/-10%</li> </ul>
Black	V-	
Brown	Off-bus extending	Connect Brown to positive (V+) to extend, current consumption <2mA.
Purple	Off-bus retracting	Connect Purple to positive (V+) to retract, current consumption <2mA.
Blue	CAN Low	
Yellow	CAN High	
White	Not used	
Green	Not used	
Orange	Not used	

**Note:** Please ensure that unused wires are well insulated to avoid damaging the internal circuit of the actuator.

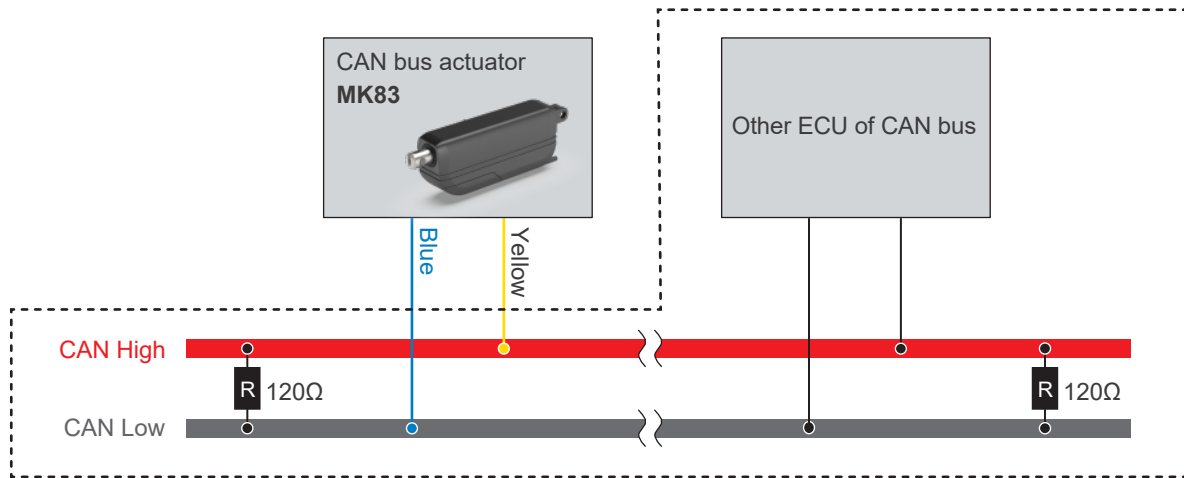
### • Off-bus operation

- (1) When the actuator has the need to repair, maintain or test without the CAN commands. There are 2 separate wires to perform the off-bus operation for extending or retracting the actuator.
- (2) It is not necessary to disconnect the CAN High and CAN Low wires when the off-bus operation is required. The priority of CAN commands and off-bus control is that whose command comes first, it will be executed first, and the next command will be accepted after the execution is completed.



- **Connect CAN bus SAE J1939 system**

Please follow the wiring guidelines of ISO-11898 standard CAN 2.0B, protocol SAE J1939. The two ends of the CAN High / Low harness should be connected with a 120Ω terminal resistor, as shown in the figure below.



**Notes:** Inside dashed lines are wirings and system of the customer.



## Ordering Key

	<b>MK83-24-H2A-10-127-J00-5-1-0-0-0-2</b>
<b>Input voltage</b>	12 : 12V DC 24 : 24V DC
<b>Motor and spindle type</b>	H2A : 5000rpm / 2mm pitch / ACME screw
<b>Gear ratio</b>	10 : 10:1
<b>Stroke</b>	XXX : 020~127mm
<b>Control options</b>	D0L : DC control + EoS DHL : DC control + Dual Hall effect sensors (NPN) + EoS D+L : DC control + Dual Hall effect sensors (PNP) + EoS DAL : DC control + Hall-POT 0~10V + EoS DBL : DC control + Hall-POT 0.5~4.5V + EoS J00 : J1939 CAN bus
<b>Front connector</b> (Refer to Page 6)	5, 6, 7, 8
<b>Rear connector</b> (Refer to Page 6)	1, 2, 3, 4
<b>Connector orientation</b> (Refer to Page 7)	0 : 0° (Standard) 9 : 90° (Front and rear connectors shown in standard 0°)
<b>Reserved</b>	0
<b>Reserved</b>	0
<b>Cable length</b> (Refer to Page 7)	2 : 750mm straight 5 : 1500mm straight 7 : 3000mm straight

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