

Actuator

MK15

MK15 is a lightweight intelligent actuator with a control board inside that can provide a thrust of 750N. The robust mechanism with high IP degree is designed for harsh environment, and its size is suitable for limited installation space. Built-in integrated control board can be developed for different control platform options and various signal outputs. MK15 is an advantageous choice for light load and short stroke applications in agriculture, construction and industrial automation.



Features and Options

- Main applications: Agriculture, Construction and Industrial Automation.
- Input voltage: 12V DC / 24V DC
- Max. load: 750N (Push / Pull)
- Max. static load: 1500N (Push / Pull)
- Speed at no load: 15mm/sec (Typical value)
- Speed at full load: 9mm/sec (Typical value)
- Spindle type: ACME screw
- Stroke: 20~127mm
- Noise level: ≤ 53 dB
- IP level: IP66 (Dynamic) / IP69K (Static; non-action)
- 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.
- Duty cycle: 20%
- 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: $-55^{\circ}\text{C} \sim +105^{\circ}\text{C}$

Control Options and Functions

• 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	DAL	DBL
Hall signal output ⁽¹⁾	-	✓	-	-
Hall-POT output 0~10V	-	-	✓	-
Hall-POT output 0.5~4.5V	-	-	-	✓
EoS signal output ⁽²⁾	✓	✓	✓	✓

Remarks:

- (1) The Hall feedback circuit of DHL option is NPN type.
(2) End of stroke signal output is not potential free.

• 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.

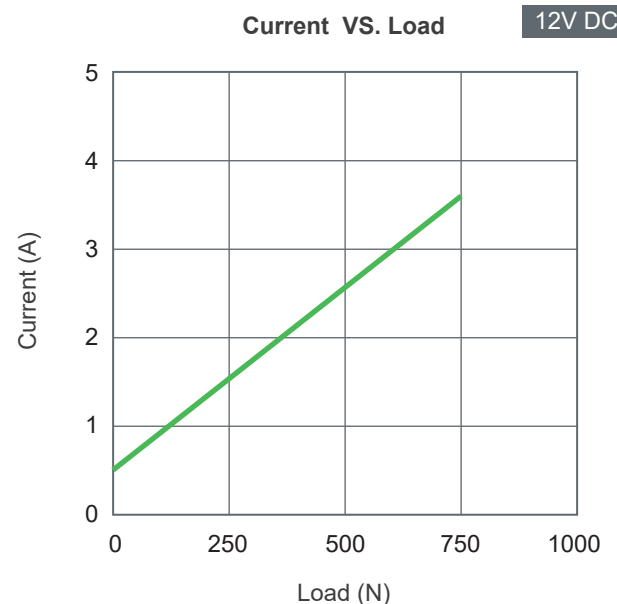
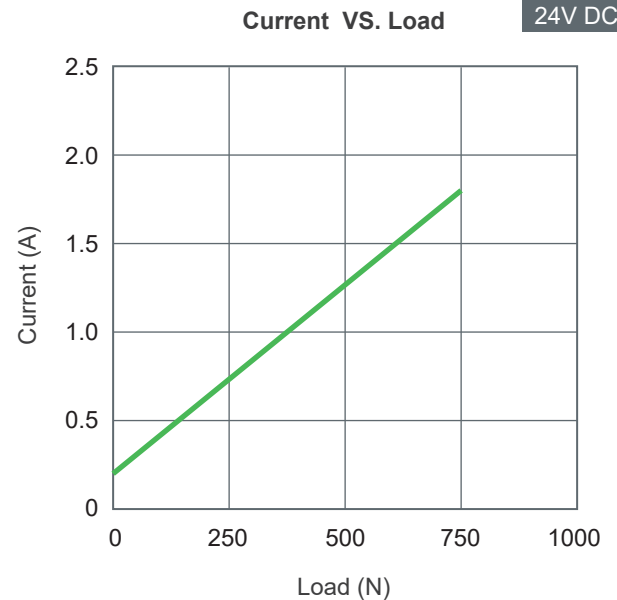
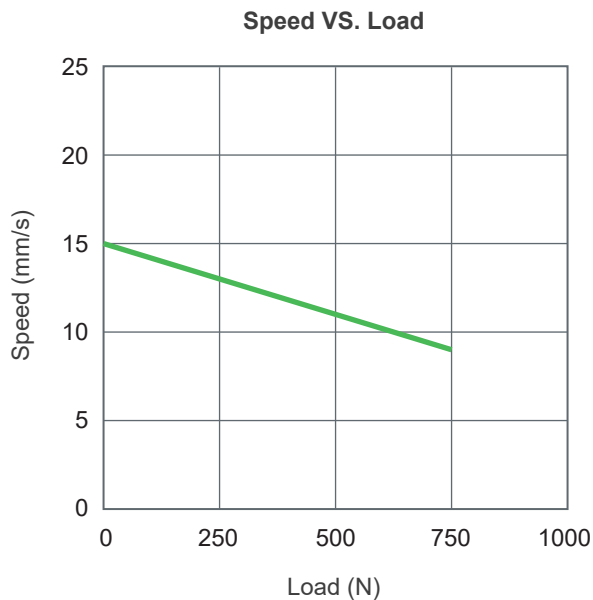
	J00
Control platform	J1939 CAN bus
H-bridge ⁽¹⁾	✓
Soft start/stop	✓
Over current protection ⁽²⁾	✓
Over voltage protection ⁽³⁾	✓
Temperature protection ⁽⁴⁾	✓
Low temp. response ⁽⁵⁾	✓
Status feedback	✓
Current feedback	✓
Position feedback	✓
Speed/ramp feedback	✓
Error code feedback	✓

Remarks:

- (1) The polarity of input DC power for the signal control options must be fixed and cannot be switched.
(2) When the current detected reaching the following value: 6A @12V DC; 3A @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.
(3) The allowable input voltage is 9~16V @12V DC; 18~32V @24V DC, if it exceeds the range, actuator will be stopped automatically.
(4) Temperature detection inside the actuator. When the temperature is detected higher than +85°C or below -40°C, actuator will be stopped automatically. It will resume operation until the high temperature is down to +80°C or the low temperature is raised to -35°C.
(5) 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	Push / Pull Max. (N)	* Typical speed (mm/s)		* Typical current (A)			
		No load	Full load	No load		Full load	
				24V	12V	24V	12V
MK15-XX-H2A-10-XXX-XXX00X	750	15	9	0.2	0.5	1.8	3.6



* Remarks:

1. 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.
2. The signal control options "J00" have stand-by current <20mA (12/24V DC).

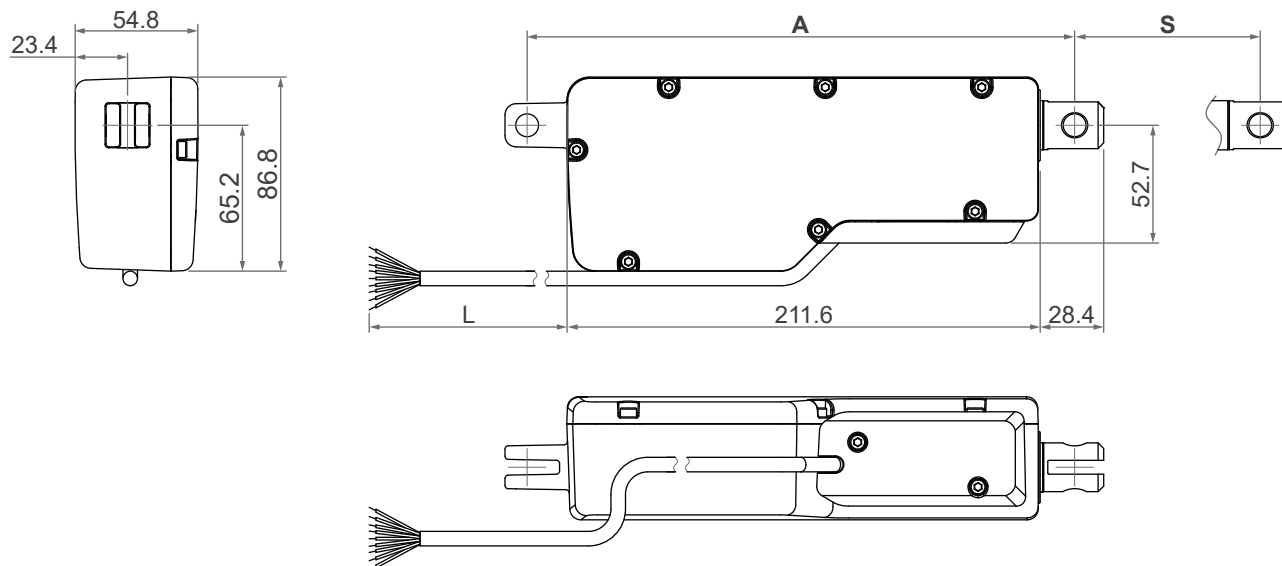
- **Inrush current**



- When the actuator starts, an inrush current of about 0.2 seconds will be generated. The starting inrush current of MK15 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

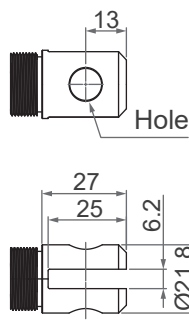
- **Available stroke (S) range** = 20~127mm (± 2 mm)
- **Extended length (B)** = Retracted length (A) + Stroke (S)
- **Retracted length (A)** = 245mm (± 2 mm)
Optional retracted length 246~345mm could be ordered. Please consult MOTECK sales for MOQ
- **Drawing**



L: Cable length outside the actuator (Refer to Page 6)

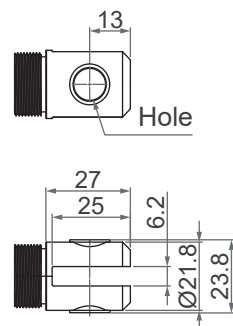
Unit: mm

• Front connector type



5 : SUS304 slot, hole Ø10.2mm

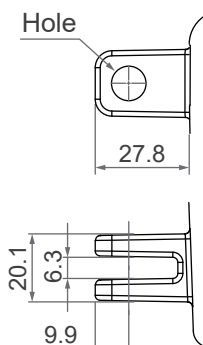
6 : SUS304 slot, hole Ø12.2mm



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

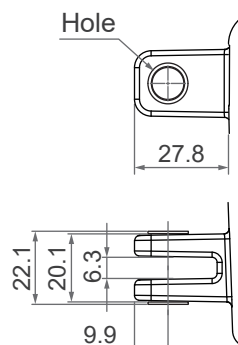
8 : SUS304 slot with bushings, hole Ø8.2mm

• Rear connector type



1 : Metal slot, hole Ø10.2mm

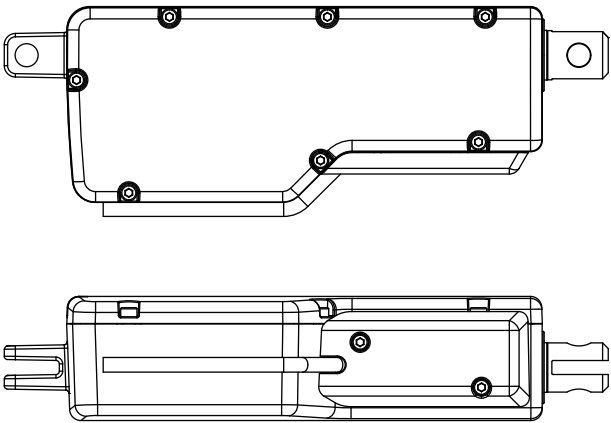
2 : Metal slot, hole Ø12.2mm



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

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

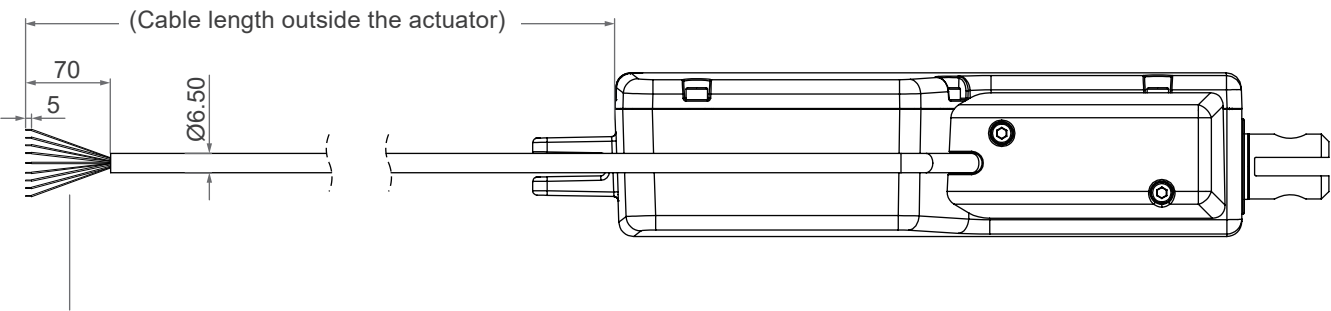
• Connector orientation



Note: Front and rear connectors shown in standard 0°

• Standard cable

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

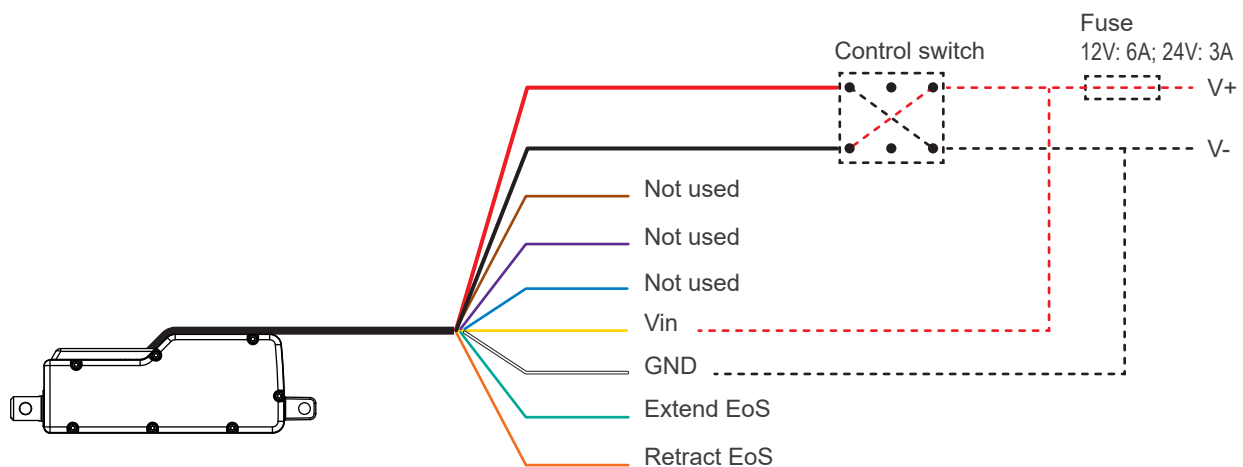


Wire color	Wire gauge
Red	18AWG
Black	18AWG
Brown	22AWG
Purple	22AWG
Blue	22AWG
Yellow	22AWG
White	22AWG
Green	22AWG
Orange	22AWG

Wiring of control options

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

• Wiring:



Remarks: All dashed lines are connected by the customer.

• Wire definitions:

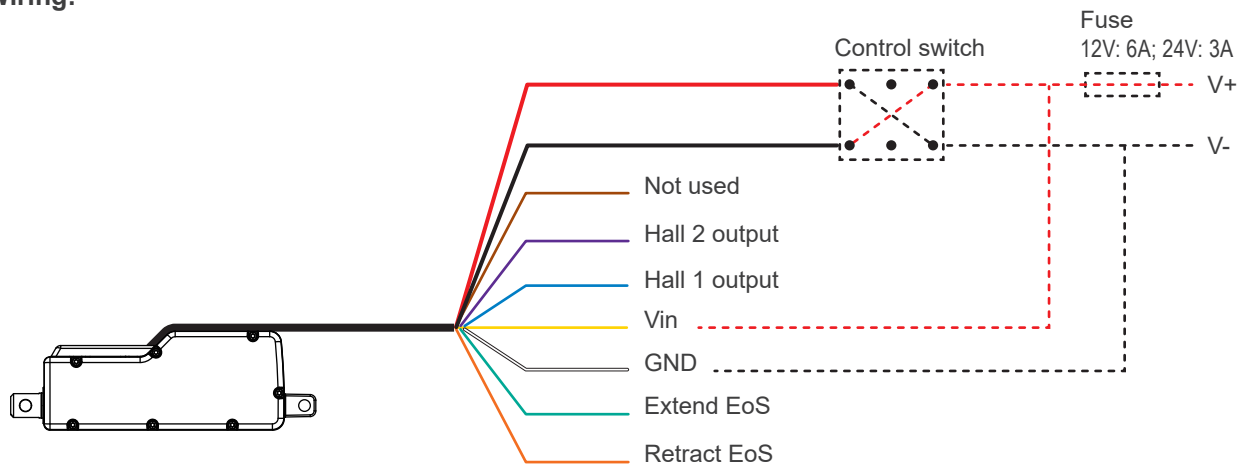
Wire color	Definition	Description
Red	V+	<ul style="list-style-type: none"> Connect red wire to "Vdc +" & black wire to "Vdc -" of DC power to extend the actuator. Switch the polarity of DC input to retract it. Input voltage: According to actuator voltage specification +/-10%
Black	V-	
Brown	Not used	
Purple	Not used	
Blue	Not used	
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"> The EoS signal is an active-high signal, i.e. the signal output from low to high when the actuator reaches the limit switches. The min. Voltage when EoS signal goes to high=$V_{in}-2V$ EoS signal output is not potential free
Orange	Retract EoS output	

Remarks: 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. Control option DHL

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

• Wiring:



Remarks: All dashed lines are connected by the customer.

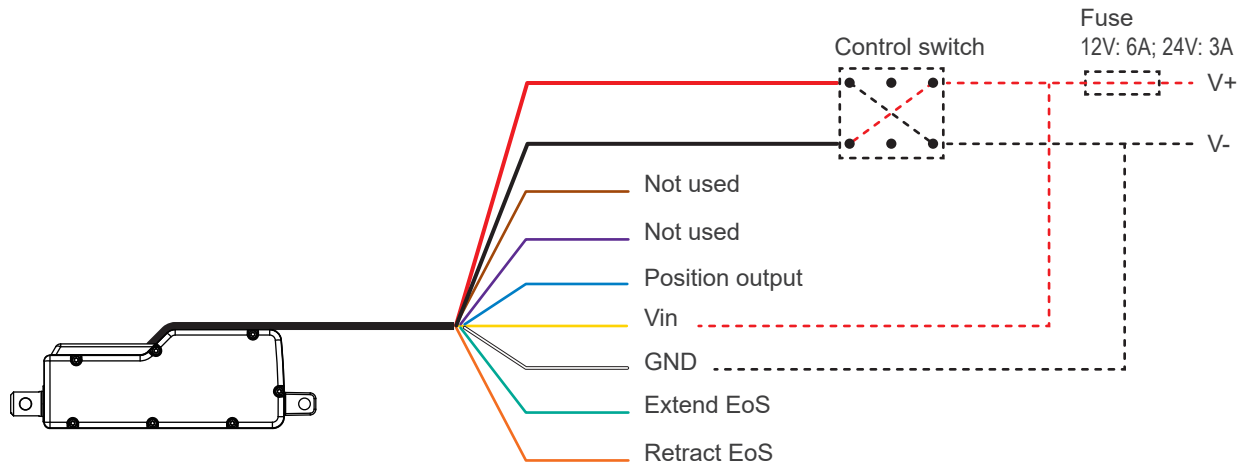
• Wire definitions:

Wire color	Definition	Description
Red	V+	<ul style="list-style-type: none"> Connect red wire to "Vdc +" & black wire to "Vdc -" of DC power to extend the actuator. Switch the polarity of DC input to retract it. Input voltage: According to actuator voltage specification +/-10%
Black	V-	
Brown	Not used	
Purple	Hall 2 output	<p>Vout High = Vin - 1.2V, I_{max} 12.7mA Vout Low = GND Hall signal data:</p> <div> <p>High Low High Low High Low High Low</p> <p>Hall 1 Hall 2</p> <p>Actuator extends Actuator retracts</p> </div> <p>Resolution: 4.0 pulses/mm</p>
Blue	Hall 1 output	
Yellow	Vin	<p>5~32V DC, same as V+ is recommended.</p> <div> <p>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.</p> </div>
White	GND	Signal GND. Both for Hall output and EoS signal.
Green	Extend EoS output	<ul style="list-style-type: none"> The EoS signal is an active-high signal, i.e. the signal output from low to high when the actuator reaches the limit switches. The min. Voltage when EoS signal goes to high=Vin-2V EoS signal output is not potential free
Orange	Retract EoS output	

Remarks: 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.


3. Control option DAL and DBL (DC control, with EoS signal output and Hall-POT voltage feedback)

- Wiring:



Remarks: All dashed lines are connected by the customer.

- Wire definitions:

Wire color	Definition	Description
Red	V+	<ul style="list-style-type: none"> Connect red wire to "Vdc +" & black wire to "Vdc -" of DC power to extend the actuator. Switch the polarity of DC input to retract it. Input voltage: According to actuator voltage specification +/-10%
Black	V-	
Brown	Not used	
Purple	Not used	
Blue	Position output	<ul style="list-style-type: none"> Position output is an analog output related to the actual position of the inner tube. Output range: DAL: 0~10V / DBL: 0.5~4.5V
Yellow	Vin	5~32V DC, same as V+ is recommended. <div>  <p>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.</p> </div>
White	GND	Signal GND. Both for Position output and EoS signal.
Green	Extend EoS output	<ul style="list-style-type: none"> The EoS signal is an active-high signal, i.e. the signal output from low to high when the actuator reaches the limit switches. The min. Voltage when EoS signal goes to high=Vin-2V EoS signal output is not potential free
Orange	Retract EoS output	

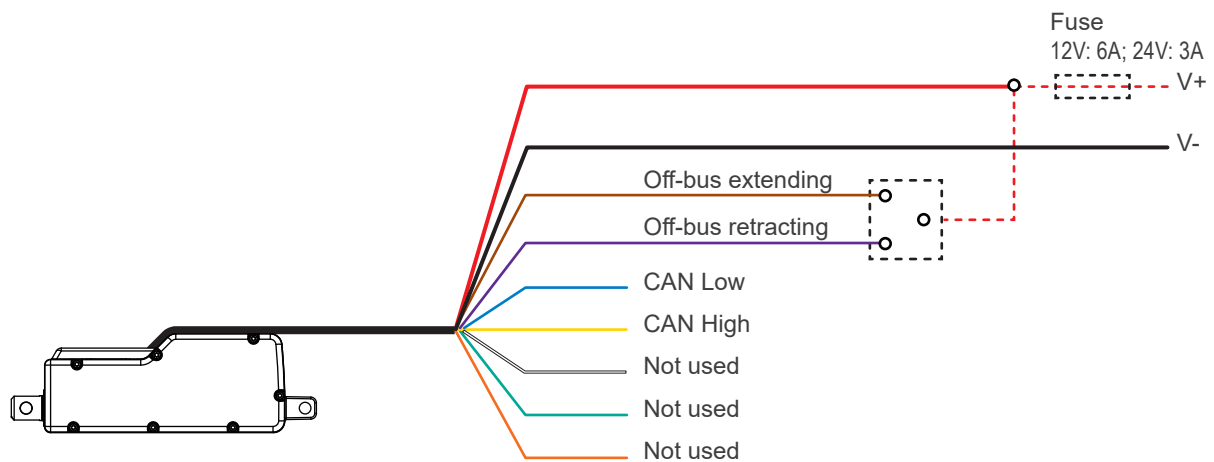
Remarks: To use the EoS signal, you must keep the power supply of the actuator and the Vin power supply, otherwise the signal will be lost.

4. 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:



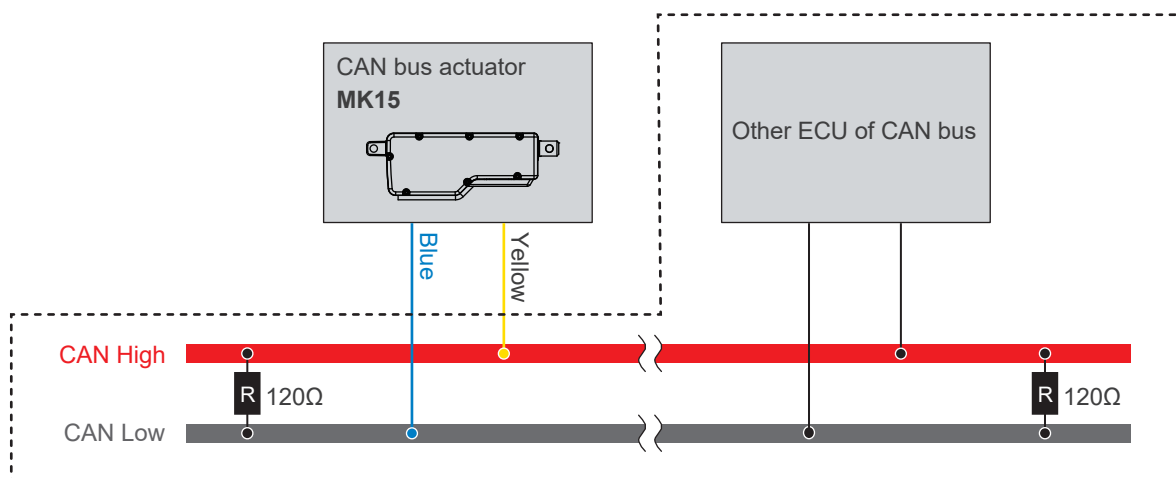
Remarks: All dashed lines are connected by the customer.

• Wire definitions:

Wire color	Definition	Description
Red	V+	<ul style="list-style-type: none">• Connect Red to positive• Connect Black to negative• Do not swap the polarity• Input voltage: According to actuator voltage specification +/-10%
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	

- **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.



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

Ordering Key

		MK15-24-H2A-10-127-J00-5-1-0-0-0-2											
Input voltage	12 : 12V DC 24 : 24V DC												
Motor and spindle type	H2A : 5000rpm / 2mm pitch / ACME screw												
Gear ratio	10 : 10:1												
Stroke	XXX : 020~127mm												
Control options	D0L : DC control + EoS DHL : DC control + Dual Hall effect sensors (NPN) + EoS DAL : DC control + Hall-POT 0~10V + EoS DBL : DC control + Hall-POT 0.5~4.5V + EoS J00 : J1939 CAN bus												
Front connector (Refer to Page 5)	5, 6, 7, 8												
Rear connector (Refer to Page 5)	1, 2, 3, 4												
Connector orientation (Refer to Page 6)	0 : 0° (Standard) 9 : 90° (Front and rear connectors shown in standard 0°)												
Reserved	0												
Reserved	0												
Cable length (Refer to Page 6)	2 : 750mm straight 5 : 1500mm straight 7 : 3000mm straight												

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