

Actuator MK35



Revision	2026.3_V3.2
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Technical changes may be made to improve the product without notice !

Content

1. General	3	4. Adjustable External Switch	31
1.1 About the manual	3	5. Troubleshooting	32
1.2 Target readers	3	6. Performance and Options	33
1.3 Symbol description	3	6.1 Performance data	33
1.4 Transport and storage	3	6.1.1 DXX / Signal control options	33
2. Important Information	4	6.1.2 Synchronous control option	34
3. Installation	5	6.2 Ordering key	35
3.1 Product label	5		
3.2 Terminology	5		
3.3 Working environment	5		
3.4 Mechanical installation	6		
3.4.1 Safety notes	6		
3.4.2 Basic installation considerations	6		
3.4.3 Force and orientation	7		
3.4.4 Cables and anti-pull lid	8		
3.4.5 Installation and operation of hand crank	8		
3.5 Electrical installation	9		
3.5.1 Safety notes	9		
3.5.2 Important information	9		
3.5.3 Fuse specification	9		
3.5.4 Electrical connections	10		
3.5.5 Wire specification	10		
3.5.6 Inrush current	10		
3.6 Installation and operation of control options	11		
3.6.1 Determine control options	11		
3.6.2 Control option D00	12		
3.6.3 Control option D0L	13		
3.6.4 Control option DPL	15		
3.6.5 Control option DHL	17		
3.6.6 Control option D+L	19		
3.6.7 Control option S0L	21		
3.6.8 Control option SPL	23		
3.6.9 Control option SHL	25		
3.6.10 Control option SYL	27		
3.6.11 Control option J00/N00	29		

1. General


1.1 About the manual

This manual is the mechanical and electrical installation instructions of MK35 electric linear actuator, and also includes performance data and details of the optional specifications. Please read the instructions carefully before installing the actuator. The installation work must be performed by qualified personnel, which is very important.

1.2 Target readers

This manual is not provided to the end user, but provides information to the system or equipment manufacturer that uses this product with information on how to install, configure and maintain this product. The system or equipment manufacturer must have qualified electromechanical personnel to perform it, and is responsible for transmitting relevant safety messages to the end user.

1.3 Symbol description

Symbol	Descriptions
	This symbol indicates important information, reminders, or safety warnings.

1.4 Transport and storage

Please use the original packaging provided by MOTECK to transport and store the actuators. The temperature during transportation and storage must be between -40°C to 100°C (-40°F to 212°F) and the cargo must be protected from collision. If you find that the packaging of the delivered goods is damaged, please check whether the actuators inside are obviously damaged, and notify the transporter. If necessary, please contact the shipper or seller to discuss the disposal.



2. Important Information



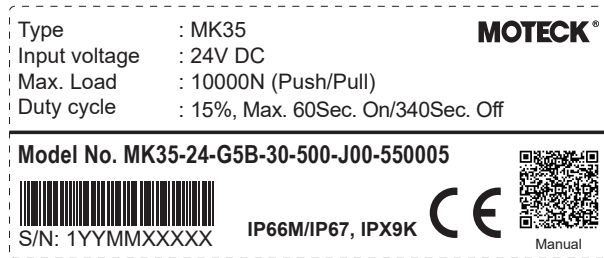
- Only qualified personnel are allowed to carry out the mechanical and electrical installation of this product. Qualified personnel should be familiar with the mechanical or electrical installation work and have corresponding work qualifications.
- Please read this manual before installing or operating the actuators.
- Do not perform mechanical installation when the actuator is powered. Complete the mechanical installation first, and then perform the electrical installation.
- **It is forbidden to use Pulse Width Modulation (PWM) as input power to MK35, otherwise it will cause malfunction and cause permanent damage.**
- Do not hold the extension tube when the device is powered on.
- Installers and operators must wear personal protective equipment according to the site conditions. And before starting to control the action of the actuator, it must be noted that the actuator and its connected mechanical moving parts are not blocked by other objects, and no one enters the dangerous area.
- Strictly follow the information in this manual and the product label of the actuators, and do not exceed the performance limits of the specification.
- Never disconnect any wires or connectors during operation or when power is applied.
- If you find the actuator any malfunction or damage, please stop using it immediately and notify qualified personnel to take corrective measures.
- Do not disassemble the actuator. Otherwise, the sealing and function of the actuator will be damaged.
- There may be grease on the extension tube. It is harmless to touch the grease, and the grease should not be removed.



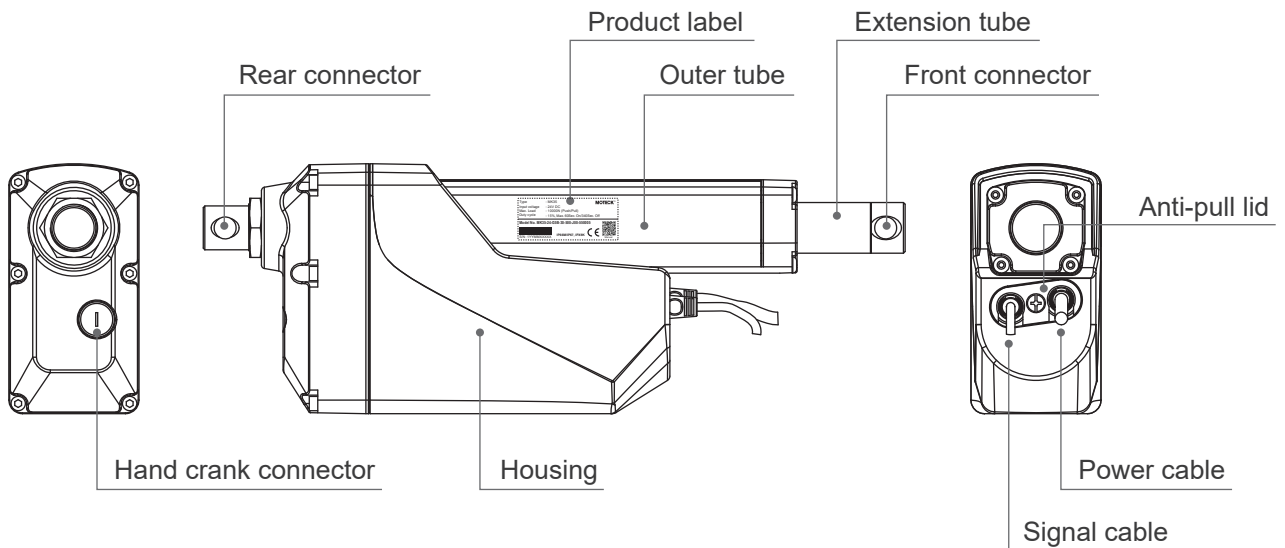
3. Installation

3.1 Product label

The product label is located on the side of the outer tube. It tells you the actuator model and basic specification. Before performing any installation or maintenance on the actuator, please check the product label to determine the actuator type. If you need any help from MOTECK, please provide the serial number and actuator model.



3.2 Terminology



3.3 Working environment



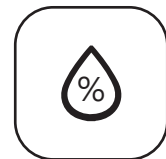
Max. temp. +85°C



Min. temp. -40°C



IP66M/IP67, IPX9K



Relative humidity 20~80%
non-condensing



3.4 Mechanical installation

3.4.1 Safety notes

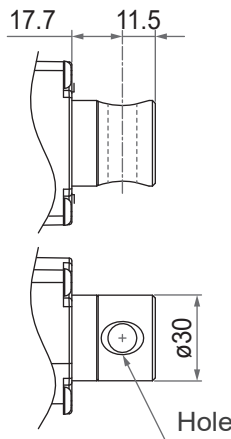


- Do not perform mechanical installation when the actuator is powered.
- Complete the mechanical installation properly before proceeding to the electrical installation steps.

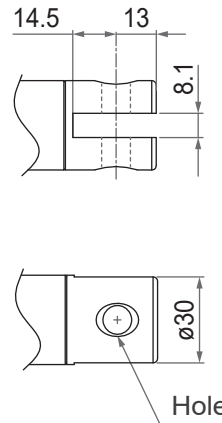
3.4.2 Basic installation considerations

- (1) Make sure the actuator is installed in a way that allows you to access the anti-pull lid so that it can be removed to plug in and out the cables (section 3.4.4)
- (2) Users may need to manually adjust the actuator in the future, so there must be enough free space around the manual drive connector to operate it (section 3.4.5)
- (3) Always use only the holes of the front and rear connectors to install the actuator. First check the model number on the product label (section 3.1), and then refer to the model coding (section 6.2) to identify the connector type of the actuator, so that you can find the dimensions specification from the figures below.

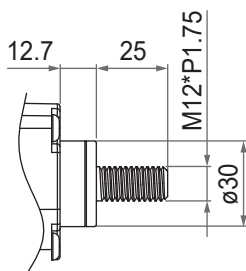
• Front connector types



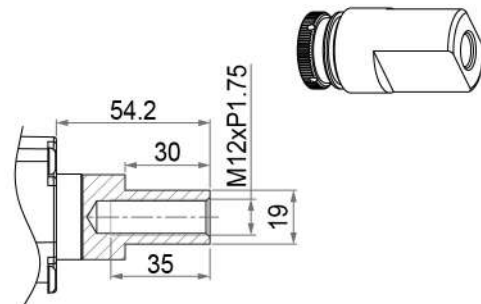
- ⑤ SUS304 solid, hole $\varnothing 12.2\text{mm}$
- ⑦ SUS304 solid, hole $\varnothing 13\text{mm}$



- ② Metal slot, hole $\varnothing 12.2\text{mm}$
- ④ Metal slot, hole $\varnothing 13\text{mm}$
- ⑥ SUS304 slot, hole $\varnothing 12.2\text{mm}$
- ⑧ SUS304 slot, hole $\varnothing 13\text{mm}$



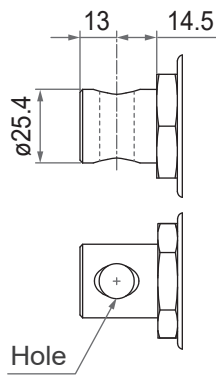
- Ⓐ SUS303 male thread M12x1.75mm



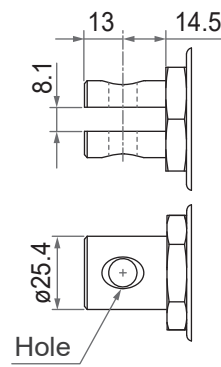
- Ⓑ SUS303 female thread M12x1.75mm



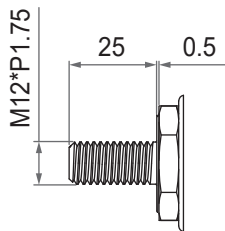
• Rear connector types



- ⑤ SUS304 solid, hole $\varnothing 12.2\text{mm}$
- ⑦ SUS304 solid, hole $\varnothing 13\text{mm}$



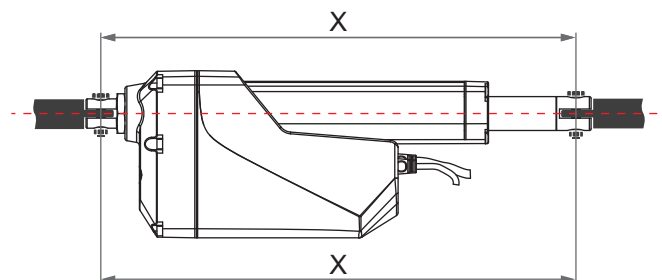
- ② Metal slot, hole $\varnothing 12.2\text{mm}$
- ④ Metal slot, hole $\varnothing 13\text{mm}$
- ⑥ SUS304 slot, hole $\varnothing 12.2\text{mm}$
- ⑧ SUS304 slot, hole $\varnothing 13\text{mm}$



- Ⓐ SUS303 male thread M12x1.75mm

3.4.3 Force and orientation

- (1) The actuator can be installed in any orientation and can withstand push and pull loads.
- (2) When installing the actuator, make ensure that the force of the load acts on the central axis of the extension tube and rear connector.
- (3) Use only solid and sized mounting pins. The mounting pins must be strong enough to support the load and prevent it from falling off after installation.
- (4) The mounting pins must be parallel to each other on the same plane, as shown in the sketch below.
- (5) If the actuator is used on the equipment to rotate with the mounting pin as the axis, it must be ensured the housing and other mechanical parts will not interfere and damage the actuator and equipment in the full range of movement.

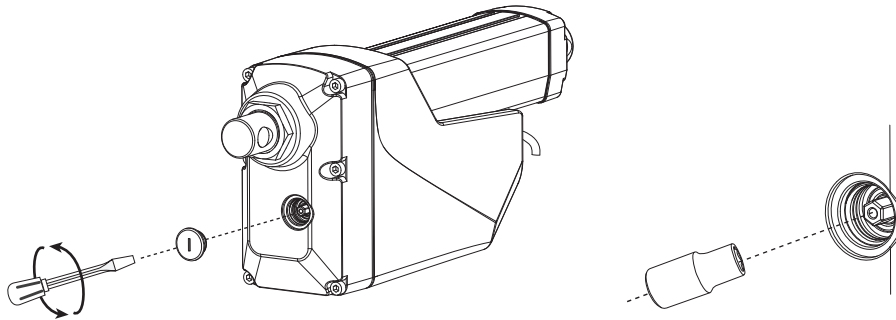


3.4.4 Cables and anti-pull lid

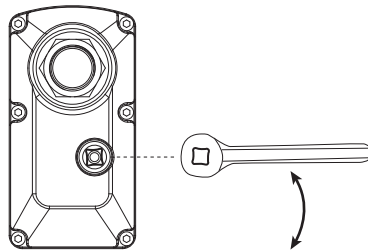
Before the actuator is shipped, the power cable and signal cable have been plugged in and the anti-pull lid has been installed. Only the CAN bus version (control option J00 or N00) needs to remove this lid and unplug the power cable when the hardware address selection (refer to the Moteck CAN bus J1939 and CANopen actuator manual for more information) is required. But please note that when installing the actuator, you must ensure that there is enough space to remove the anti-pull lid with tools.

3.4.5 Installation and operation of hand crank

- (1) When installing the actuator, please make sure that there is enough space between the rear connector and any objects behind it so that the hand crank can be operated.
- (2) Please use a flat-head screwdriver to remove the cover and connect with a 6mm hexagon socket.



- (3) Use a wrench to operate as a hand crank.



- (4) Under the maximum load of the actuator, the maximum torque required to drive the extension tube with the hand crank is about 1.4Nm.
- (5) The distance traveled by the actuator per rotation of the hand crank is related to the gear ratio options of the actuator. Please refer to the table below.

Gear type	mm /rev
5	2.247
10	1.349
15	0.804
20	0.609
30	0.386



- Before using the hand crank, be sure to turn off the actuator power. Do not apply torque exceeding 1.7Nm on the hand crank.
- Do not move the extension tube to both ends of the stroke, otherwise the actuator might be damaged.
- Do not use any type of automatic drill or power tools to drive the manual crank.

3.5 Electrical installation

3.5.1 Safety notes



- It is recommended to install an emergency stop switch at a suitable location of the power supply line.
- Do not install or wire the actuator without cutting off the power supply.
- Before controlling the action of the actuator, it must be noted that the actuator and its connected mechanical moving parts are not blocked by other objects, and no one enters the dangerous area.

3.5.2 Important information



- It is forbidden to wind the signal cable with the power cable to avoid interference with the signal.
- Avoid using the vehicle as a ground to reduce the risk of interference.
- The longer the power cord length or the smaller the wire diameter, the worse the voltage drop. When the voltage of the power supply is low, it is more likely to cause insufficient voltage and cause malfunctions.
- Relays or other coils on operating equipment should have spark protection to avoid interference.
- In order to achieve the longest service life, the actuator should not be stopped by frequent hard collisions. Before the actuator moves to the target position or both ends of the stroke, the user's automatic control device should cut off the power of the motor in advance according to the absolute position information, and use the inertia to make the actuator stop gently.

3.5.3 Fuse specification

Install a slow-blow fuse of this specification between the actuator and the power supply for protection.

Input voltage	Fuse specification
12V DC	40A
24V DC	20A
48V DC	10A



3.5.4 Electrical connections

Actuator is equipped with a power cable and a signal cable. One end of each cable has been plugged and fixed on the actuator before shipment, and the other end are bare wire contacts for customers to connect power and signal transmission. Please check the model number on the product label (section 3.1) first, then refer to the model coding (section 6.2) to identify the control options of the actuator, and connect the power cable and signal cable correctly according to the description of each control option (section 3.6).

3.5.5 Wire specification

• Power cable and extension cord

To avoid malfunctions caused by voltage drop, the cross-section of the power cable wire must be large enough. The cross-section of the MK35 power cable wire is 2.0mm² (14AWG) and the maximum length is 3 meters. If the customer must connect an extension cord, the wire requirements of the extension cord are as follows.

Minimum cross section	Maximum length
4mm ² (AWG 12)	4m

• Signal cable and extension cord

The cross-section of the MK35 signal cable wire is 0.3mm² (22AWG) and the maximum length is 3 meters. If the customer must connect an extension cord, the wire requirements of the extension cord are as follows.

Minimum cross section	Maximum length
0.5mm ² (AWG 20)	4m

3.5.6 Inrush current



- When the actuator starts, an inrush current of about 0.2 seconds will be generated. The starting inrush current of MK35 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.

3.6 Installation and wiring of control options

3.6.1 Determine control options

MK35 actuator is equipped with one of the control options in the table below. Please check the model number on the product label (section 3.1), and then refer to the model coding (section 6.2) to identify the control options of the actuator. Then check the corresponding sections in the table below for more details.

Options	Control platform	Potentiometer output	Hall signal output		EoS signal output ⁽¹⁾	Motion status feedback	Section
			NPN	PNP			
D00	Classic (DC control) ⁽²⁾						3.6.2
D0L					✓		3.6.3
DPL		✓			✓		3.6.4
DHL			✓		✓		3.6.5
D+L				✓	✓		3.6.6
S0L						✓	
SPL	Low current signal	✓			✓		3.6.8
SHL			✓		✓		3.6.9
SYL ⁽²⁾							3.6.10
J00		CAN bus J1939					✓
N00	CANopen					✓	3.6.11

Notes:

⁽¹⁾ End of stroke signal output

⁽²⁾ All DC control options and SYL option are only available for 12/24V motors

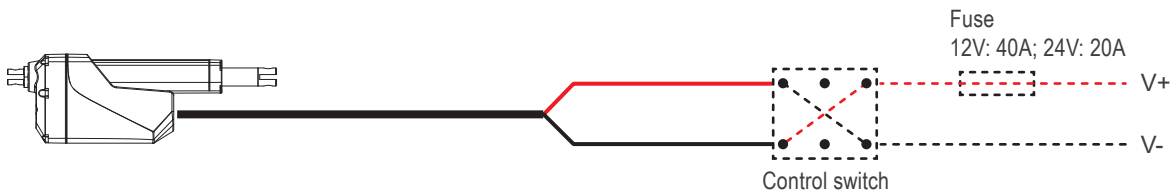


3.6.2 Control option D00 (DC control, without positioning feedback.)

Option D00 controls the actuator to extend or retract by switching the polarity of the input DC power.

- (1) When the actuator reaches the limit position at both ends of the stroke, it will still stop by itself, but it will not output a signal of reaching the limit.
- (2) Do not adjust the input voltage in an attempt to control the speed of the MK35 DXX control options.
- (3) The D00 option does not include a signal cable, and the port has a waterproof cap.

• Wiring



Note: Dashed lines are connected by the customer.

• Wire definitions

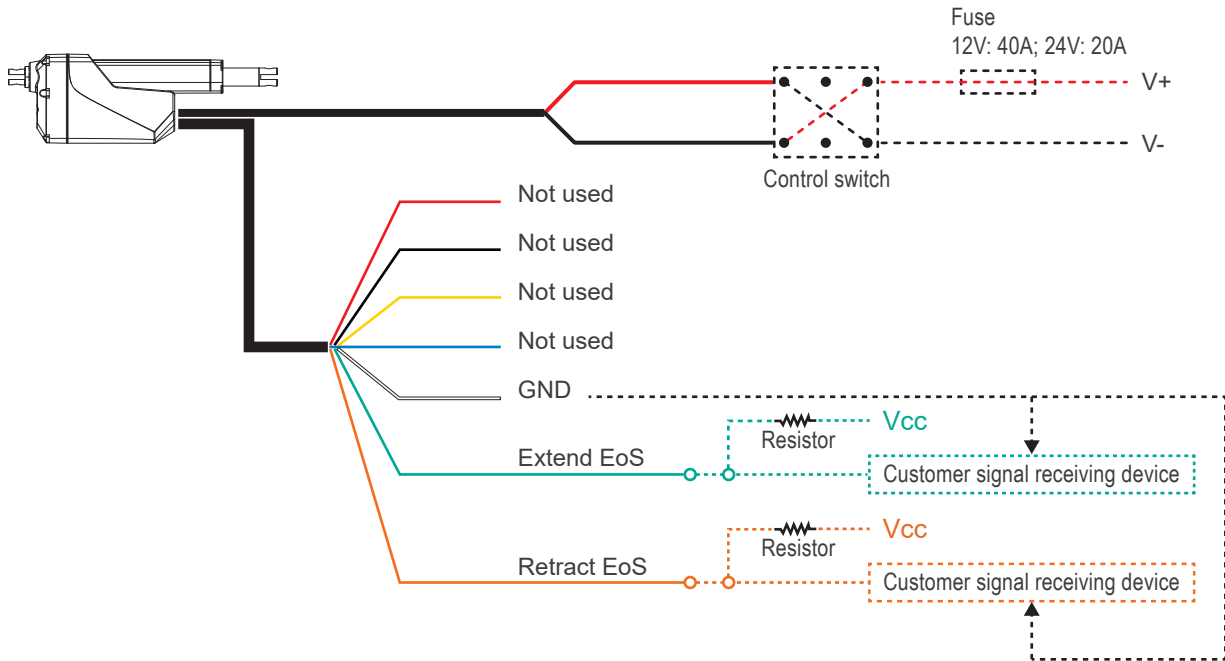
	Wire color	Definition	Description
Power cable	Red	DC power	<ul style="list-style-type: none"> • Connect red wire to "Vdc +" & black wire to "Vdc -" of DC power to extend the actuator. Switch the polarity of DC input to retract it. • Input voltage: According to actuator voltage specification $\pm 10\%$
	Black		



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

In addition to all the functions included in the D00 option (section 3.6.2), the D0L option is also with an arrival signal output when it reaches the end of stroke (EoS), so that the customer system can perform corresponding control, such as light signal display, relay action, etc.

• Wiring



Note: All dashed lines are connected by the customer.



- Wire definitions

	Wire color	Definition	Description
Power cable	Red	DC power	<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 $\pm 10\%$
	Black		
Signal cable	Red	Not used	
	Black	Not used	
	Yellow	Not used	
	Blue	Not used	
	White	GND	Connect to customer signal receiving device GND
	Green	Extend EoS output	<ul style="list-style-type: none"> • The stroke limit switches are open collector circuit, and the arrival signal output is not potential free. A pull-up resistor should be applied in user's control circuit (see the wiring diagram on Page 13), the resistance of 10KΩ is recommended.
	Orange	Retract EoS output	<ul style="list-style-type: none"> • Recommended input voltage Vcc = 5~24V • Signal voltage during the stroke = GND (Normally closed circuit) • End of stroke signal voltage = Vcc (Open circuit)

Notes:

- (1) To use the limit arrival signal, you must keep the power supply of the actuator, otherwise the signal will be lost.
- (2) Please ensure that unused wires are well insulated to avoid damaging the internal circuit of the actuator.
- (3) The EoS signal output wire must not shorted to GND to prevent the malfunction of limit switches.



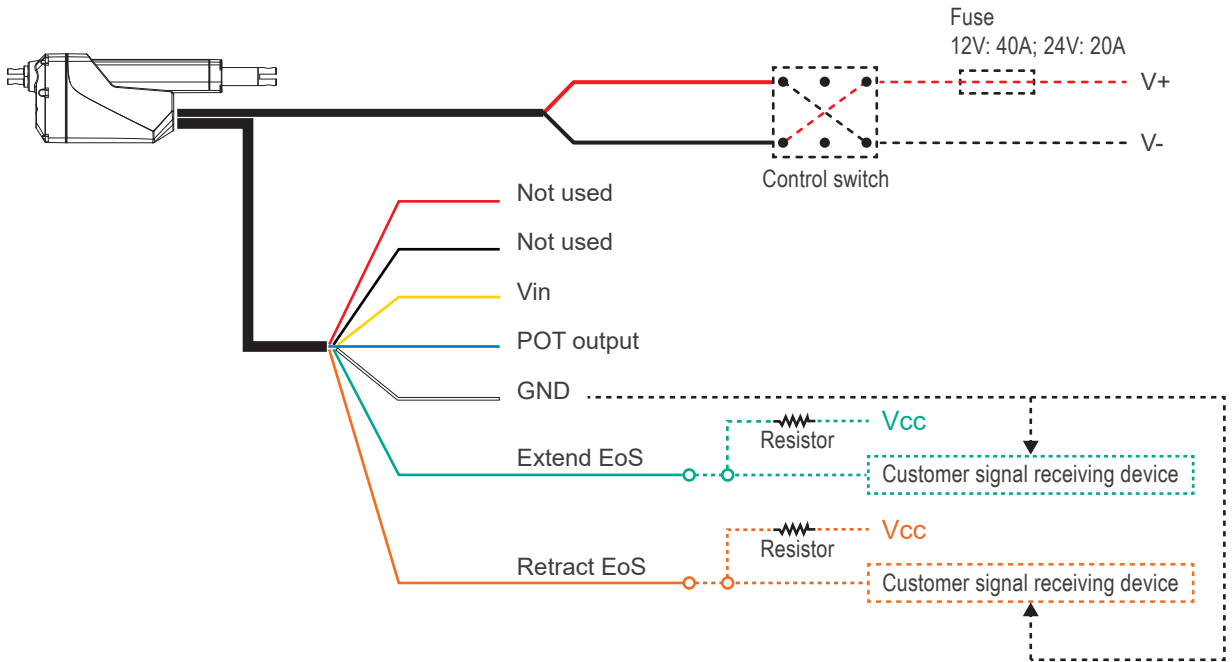
3.6.4 Control option DPL (DC control, with EoS signal output and potentiometer positioning output.)

In addition to all the functions included in the D00 and D0L options (section 3.6.2 & 3.6.3), the DPL option is also equipped with a potentiometer, which allows the user's control device to know the absolute position of the actuator at any time, and can be used to determine the speed and direction of the actuator's movement.



The potential value of the mechanical potentiometer can be measured through the signal wires. This value is only related to the stroke position. Even if the power supply is interrupted, it will not change the measurable potential value.

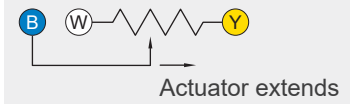
• **Wiring**



Note: All dashed lines are connected by the customer.



• Wire definitions: DPL

	Wire color	Definition	Description						
Power cable	Red	DC power	<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 $\pm 10\%$ 						
	Black								
Signal cable	Red	Not used							
	Black	Not used							
	Yellow	Vin	The recommended voltage: 5~32V						
	Blue	POT output	<p>1. Potentiometer specification:</p> <ul style="list-style-type: none"> - 10K ohm, 10 turns. - Total resistance tolerance $\pm 5\%$ - Independent linearity $\pm 0.25\%$ <p>2. Output voltage: The voltage (resistance) between Blue and White increases linearly from about 0 when the actuator extends from the lower limit position, and decreases when it retracts.</p>  <p>3. There are different resolutions according to the stroke length (as table below)</p> <table border="1" data-bbox="732 1005 1385 1135"> <thead> <tr> <th>Stroke range (mm)</th> <th>Resolution (ohm/mm)</th> </tr> </thead> <tbody> <tr> <td>100~450</td> <td>19.685</td> </tr> <tr> <td>451~950</td> <td>9.843</td> </tr> </tbody> </table> <p>4. The potential value can be measured through the POT output and GND wires.</p>	Stroke range (mm)	Resolution (ohm/mm)	100~450	19.685	451~950	9.843
	Stroke range (mm)	Resolution (ohm/mm)							
	100~450	19.685							
	451~950	9.843							
White	GND	Signal GND. Both for POT output and customer signal receiving device.							
Green	Extend EoS output	<ul style="list-style-type: none"> • The stroke limit switches are open collector circuit, and the arrival signal output is not potential free. A pull-up resistor should be applied in user's control circuit (see the wiring diagram on Page 15), the resistance of 10KΩ is recommended. • Recommended input voltage Vcc = 5~24V • Signal voltage during the stroke = GND (Normally closed circuit) • End of stroke signal voltage = Vcc (Open circuit) 							
Orange	Retract EoS output								

Notes:

- (1) To use the limit arrival signal, you must keep the power supply of the actuator, otherwise the signal will be lost.
- (2) Please ensure that unused wires are well insulated to avoid damaging the internal circuit of the actuator.
- (3) The EoS signal output wire must not shorted to GND to prevent the malfunction of limit switches.



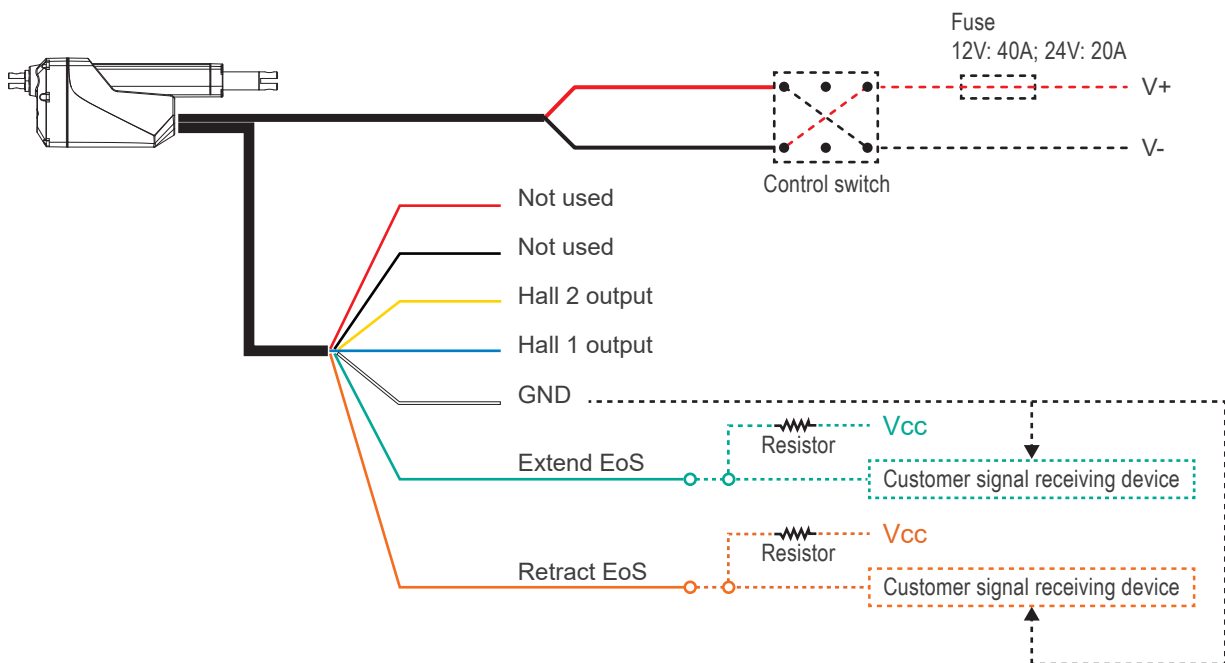
3.6.5 Control option DHL (DC control, with EoS signal output and dual Hall effect sensors feedback-NPN type.)

In addition to all the functions of the D00 and D0L options (section 3.6.2 & 3.6.3), the DHL option is also equipped with dual Hall effect sensors, providing an NPN-type feedback signal.



The Hall feedback is a relative positioning. DHL version of the actuator does not have built-in memory, and the position signal will disappear after power-off. The customer's control device must have the function of reading the position signal and recording it.

• Wiring



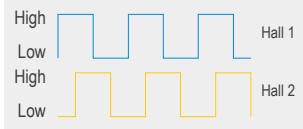
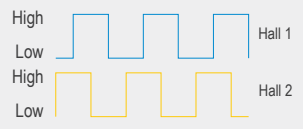
Note: All dashed lines are connected by the customer.



- The polarity of the input DC power must be fixed in accordance with the specified connection method, and the polarity cannot be switched at any time.
- It is forbidden to adjust the input voltage in an attempt to control the speed of the MK35 SXX control options. The battery or full-wave rectified DC power used must be within acceptable voltage range, otherwise the actuator will stop operating.



• Wire definitions: DHL

	Wire color	Definition	Description												
Power cable	Red	DC power	<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 $\pm 10\%$ 												
	Black														
Signal cable	Red	Not used													
	Black	Not used													
	Yellow	Hall 2 output	High = 10.8V ($\pm 0.6V$), I _{max} 12.7mA Low = GND Hall signal data: <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>Actuator extends</p> </div> <div style="text-align: center;">  <p>Actuator retracts</p> </div> </div>												
	Blue	Hall 1 output	Resolution: <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Gear ratio</th> <th>Resolution (Pulse/mm)</th> </tr> </thead> <tbody> <tr> <td>05</td> <td>1.0570</td> </tr> <tr> <td>10</td> <td>1.7601</td> </tr> <tr> <td>15</td> <td>2.9552</td> </tr> <tr> <td>20</td> <td>3.9028</td> </tr> <tr> <td>30</td> <td>6.1603</td> </tr> </tbody> </table>	Gear ratio	Resolution (Pulse/mm)	05	1.0570	10	1.7601	15	2.9552	20	3.9028	30	6.1603
	Gear ratio	Resolution (Pulse/mm)													
	05	1.0570													
	10	1.7601													
15	2.9552														
20	3.9028														
30	6.1603														
White	GND	Signal GND. Both for Hall output and customer signal receiving device.													
Green	Extend EoS output	<ul style="list-style-type: none"> The stroke limit switches are open collector circuit, and the arrival signal output is not potential free. A pull-up resistor should be applied in user's control circuit (see the wiring diagram on Page 17), the resistance of 10KΩ is recommended. 													
Orange	Retract EoS output	<ul style="list-style-type: none"> Recommended input voltage V_{cc} = 5~24V Signal voltage during the stroke = GND (Normally closed circuit) End of stroke signal voltage = V_{cc} (Open circuit) 													

Notes:

- (1) To use the limit arrival signal, you must keep the power supply of the actuator, otherwise the signal will be lost.
- (2) Please ensure that unused wires are well insulated to avoid damaging the internal circuit of the actuator.
- (3) The EoS signal output wire must not shorted to GND to prevent the malfunction of limit switches.



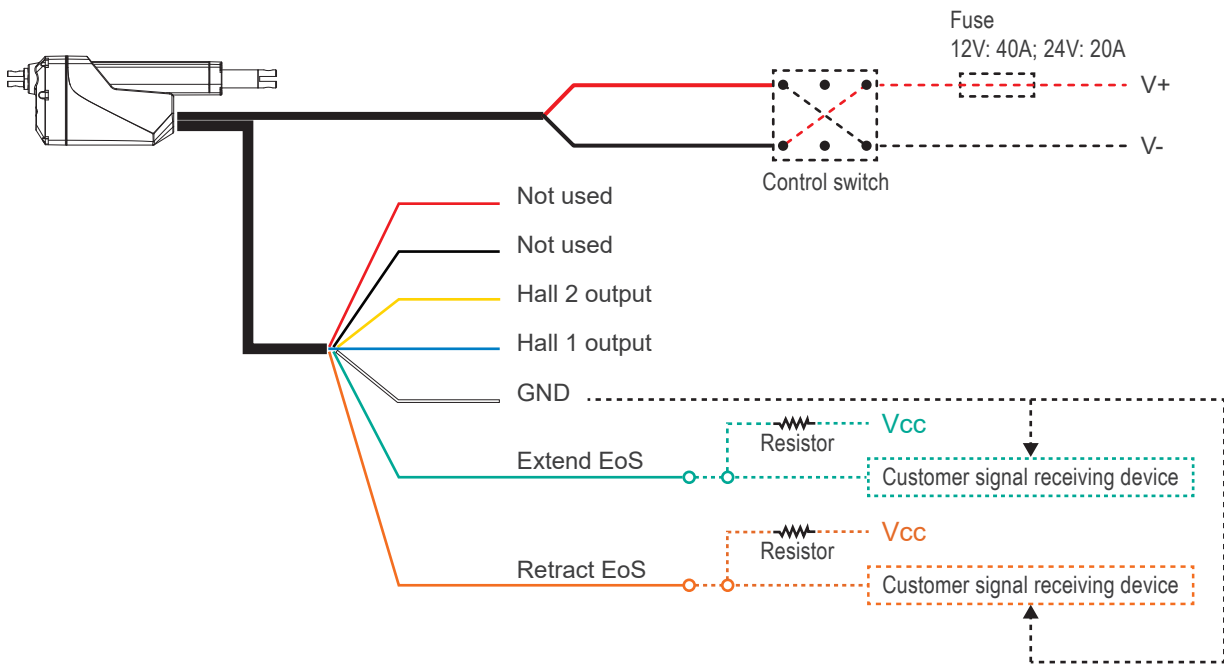
3.6.6 Control option D+L (DC control, with EoS signal output and dual Hall effect sensors feedback-PNP type.)

In addition to all the functions of the D00 and D0L options (section 3.6.2 & 3.6.3), the D+L option is also equipped with dual Hall effect sensors, providing an PNP-type feedback signal.



The Hall feedback is a relative positioning. D+L version of the actuator does not have built-in memory, and the position signal will disappear after power-off. The customer's control device must have the function of reading the position signal and recording it.

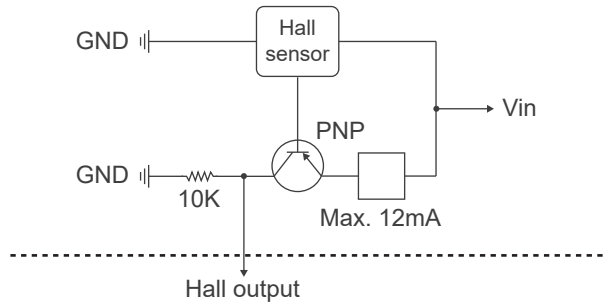
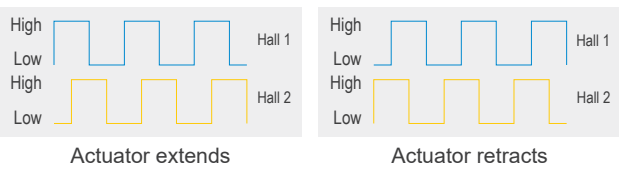
• **Wiring**



Note: All dashed lines are connected by the customer.



• Wire definitions: D+L

	Wire color	Definition	Description												
Power cable	Red	DC power	<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 $\pm 10\%$ 												
	Black														
Signal cable	Red	Not used													
	Black	Not used													
	Yellow	Hall 2 output	<p>High = 10.8V ($\pm 0.6V$), Source current max. 12mA Low = 10KΩ pull down (See internal circuit diagram)</p>  <p>Hall signal data:</p>  <p>Resolution:</p> <table border="1" data-bbox="746 1193 1372 1415"> <thead> <tr> <th>Gear ratio</th> <th>Resolution (Pulse/mm)</th> </tr> </thead> <tbody> <tr> <td>05</td> <td>1.0570</td> </tr> <tr> <td>10</td> <td>1.7601</td> </tr> <tr> <td>15</td> <td>2.9552</td> </tr> <tr> <td>20</td> <td>3.9028</td> </tr> <tr> <td>30</td> <td>6.1603</td> </tr> </tbody> </table>	Gear ratio	Resolution (Pulse/mm)	05	1.0570	10	1.7601	15	2.9552	20	3.9028	30	6.1603
	Gear ratio	Resolution (Pulse/mm)													
	05	1.0570													
	10	1.7601													
	15	2.9552													
20	3.9028														
30	6.1603														
Blue	Hall 1 output														
White	GND	Signal GND. Both for Hall output and customer signal receiving device.													
Green	Extend EoS output	<ul style="list-style-type: none"> The stroke limit switches are open collector circuit, and the arrival signal output is not potential free. A pull-down resistor should be applied in user's control circuit (see the wiring diagram on Page 19), the resistance of 10KΩ is recommended. Recommended input voltage $V_{cc} = 5\sim 24V$ Signal voltage during the stroke = GND (Normally closed circuit) End of stroke signal voltage = V_{cc} (Open circuit) 													
Orange	Retract EoS output														

Notes:

- (1) To use the limit arrival signal, you must keep the power supply of the actuator, otherwise the signal will be lost.
- (2) Please ensure that unused wires are well insulated to avoid damaging the internal circuit of the actuator.
- (3) The EoS signal output wire must not shorted to GND to prevent the malfunction of limit switches.



3.6.7 Control option S0L (Low current signal control, with EoS signal output.)

Option S0L uses a low current (<10mA) input signal to control the extension, retraction or stop of the actuator, and there is an arrival signal output when it reaches the end of stroke (EoS). However, if the user does not need EoS signal, these two signal output wires can be ignored and unconnected. This does not affect the other functions of the actuator, and the actuator will still stop when it reaches the limit positions at both ends of the stroke.

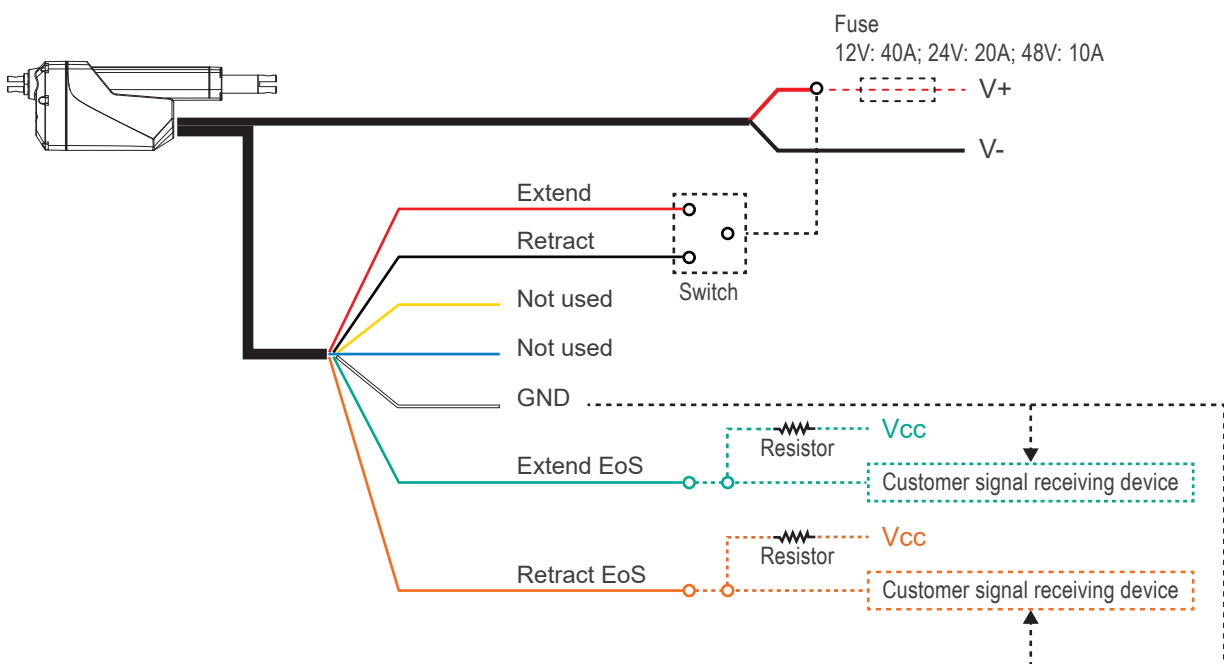
In addition, the actuator also has the following functions:

- (1) At both ends of the mechanical stroke and within the full stroke range, when the current exceeds the factory preset value of the rated load (overload condition), the actuator will automatically stop.
- (2) When the input voltage exceeds its normal working range, the actuator will stop running. After the correct voltage input is restored, the operation signal must be re-sent to restore control.
- (3) With automatic soft start function, make the equipment move smoothly.



- The polarity of the input DC power must be fixed in accordance with the specified connection method, and the polarity cannot be swapped at any time.
- The battery or full-wave rectified DC power used must be within acceptable voltage range, otherwise the actuator will stop operating.
- It is forbidden to adjust the input voltage in an attempt to control the speed of the MK35 SXX control options.
- The EoS signal output wire must not be shorted to GND to prevent the malfunction of limit switches.

• Wiring



Note: All dashed lines are connected by the customer.



• Wire definitions: S0L

	Wire color	Definition	Description
Power cable	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 $\pm 10\%$
	Black	V-	
Signal cable	Red	Actuator extends	Connect Red to positive (V+) to extend, input current <10mA.
	Black	Actuator retracts	Connect Black to positive (V+) to retract, input current <10mA.
	Yellow	Not used	
	Blue	Not used	
	White	GND	Connect to customer signal receiving device GND
	Green	Extend EoS output	<ul style="list-style-type: none"> • The stroke limit switches are open collector circuit, and the arrival signal output is not potential free. A pull-up resistor should be applied in user's control circuit (see the wiring diagram on Page 21), the resistance of 10KΩ is recommended. • Recommended input voltage Vcc = 5~24V • Signal voltage during the stroke = GND (Normally closed circuit) • End of stroke signal voltage = Vcc (Open circuit)
	Orange	Retract EoS output	

Notes:

- (1) To use the limit arrival signal, you must keep the power supply of the actuator, otherwise the signal will be lost.
- (2) Please ensure that unused wires are well insulated to avoid damaging the internal circuit of the actuator.
- (3) The EoS signal output wire must not shorted to GND to prevent the malfunction of limit switches.



3.6.8 Control option SPL

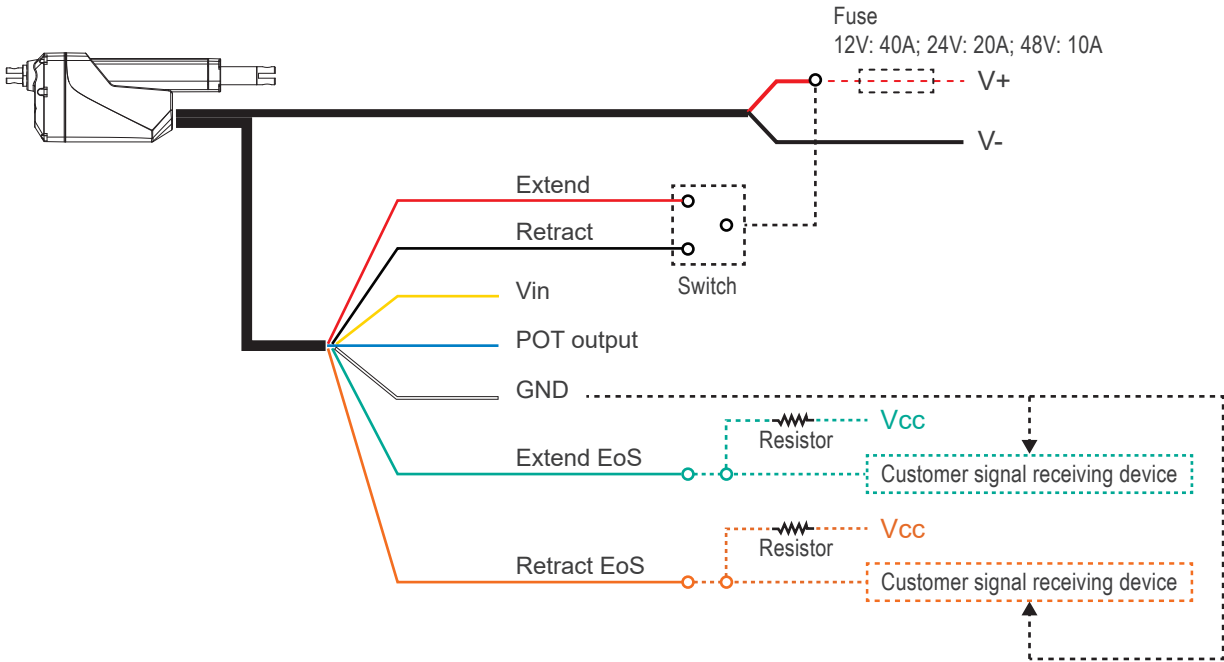
(Low current signal control, with EoS signal output and potentiometer positioning output.)

In addition to all the functions included in the S0L option (section 3.6.7), the SPL option is also equipped with a potentiometer, which allows the user's control device to know the absolute position of the actuator at any time, and can be used to determine the speed and direction of the actuator's movement.



- The polarity of the input DC power must be fixed in accordance with the specified connection method, and the polarity cannot be switched at any time.
- The battery or full-wave rectified DC power used must be within acceptable voltage range, otherwise the actuator will stop operating.
- It is forbidden to adjust the input voltage in an attempt to control the speed of the MK35 SXX control options.
- The EoS signal output wire must not be shorted to GND to prevent the malfunction of limit switches.
- The potential value of the mechanical potentiometer can be measured through the signal wires. This value is only related to the stroke position. Even if the power supply is interrupted, it will not change the measurable potential value.

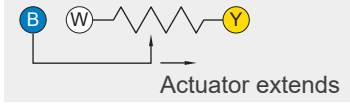
• Wiring



Note: All dashed lines are connected by the customer.



• Wire definitions: SPL

	Wire color	Definition	Description						
Power cable	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 $\pm 10\%$ 						
	Black	V-							
Signal cable	Red	Actuator extends	Connect Red to positive (V+) to extend, input current <10mA.						
	Black	Actuator retracts	Connect Black to positive (V+) to retract, input current <10mA.						
	Yellow	Vin	The recommended voltage: 5~32V						
	Blue	POT output	<p>1. Potentiometer specification:</p> <ul style="list-style-type: none"> - 10K ohm, 10 turns. - Total resistance tolerance $\pm 5\%$ - Independent linearity $\pm 0.25\%$ <p>2. Output voltage: The voltage (resistance) between Blue and White increases linearly from about 0 when the actuator extends from the lower limit position, and decreases when it retracts.</p>  <p>3. There are different resolutions according to the stroke length (as table below)</p> <table border="1" data-bbox="742 1048 1394 1178"> <thead> <tr> <th>Stroke range (mm)</th> <th>Resolution (ohm/mm)</th> </tr> </thead> <tbody> <tr> <td>100~450</td> <td>19.685</td> </tr> <tr> <td>451~950</td> <td>9.843</td> </tr> </tbody> </table> <p>4. The potential value can be measured through the POT output and GND wires.</p>	Stroke range (mm)	Resolution (ohm/mm)	100~450	19.685	451~950	9.843
	Stroke range (mm)	Resolution (ohm/mm)							
	100~450	19.685							
	451~950	9.843							
White	GND	Signal GND. Both for POT output and customer signal receiving device.							
Green	Extend EoS output	<ul style="list-style-type: none"> • The stroke limit switches are open collector circuit, and the arrival signal output is not potential free. A pull-up resistor should be applied in user's control circuit (see the wiring diagram on Page 23), the resistance of 10KΩ is recommended. • Recommended input voltage $V_{cc} = 5\sim 24V$ • Signal voltage during the stroke = GND (Normally closed circuit) • End of stroke signal voltage = V_{cc} (Open circuit) 							
Orange	Retract EoS output								

Notes:

- (1) To use the limit arrival signal, you must keep the power supply of the actuator, otherwise the signal will be lost.
- (2) Please ensure that unused wires are well insulated to avoid damaging the internal circuit of the actuator.
- (3) The EoS signal output wire must not shorted to GND to prevent the malfunction of limit switches.



3.6.9 Control option SHL

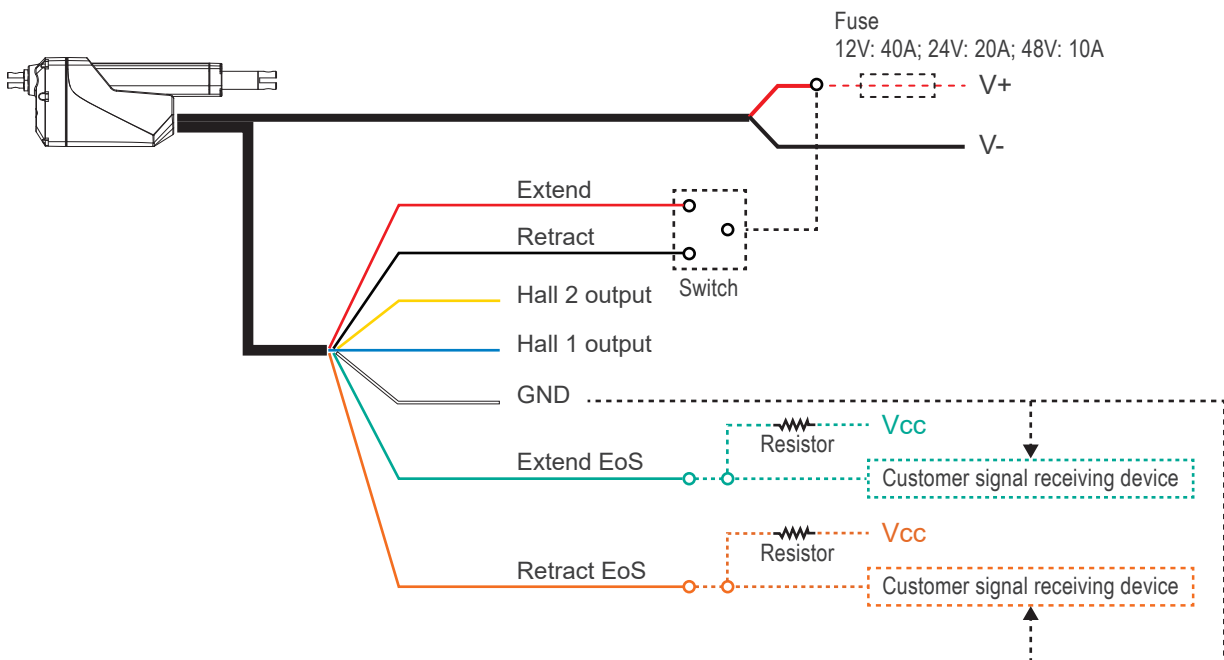
(Low current signal control, with EoS signal output and dual Hall effect sensors feedback-NPN type.)

In addition to all the functions of the SOL option (section 3.6.7), the SHL option is also equipped with dual Hall effect sensors.



- The polarity of the input DC power must be fixed in accordance with the specified connection method, and the polarity cannot be switched at any time.
- The battery or full-wave rectified DC power used must be within acceptable voltage range, otherwise the actuator will stop operating.
- It is forbidden to adjust the input voltage in an attempt to control the speed of the MK35 SXX control options.
- The EoS signal output wire must not be shorted to GND to prevent the malfunction of limit switches.
- The Hall feedback is a relative positioning. SHL version of the actuator does not have built-in memory, and the position signal will disappear after power-off. The customer's control device must have the function of reading the position signal and recording it.

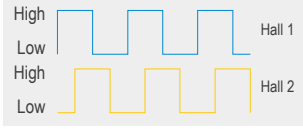
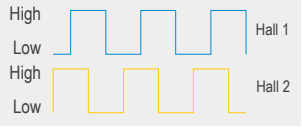
• Wiring



Note: All dashed lines are connected by the customer.



● Wire definitions: SHL

	Wire color	Definition	Description												
Power cable	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 $\pm 10\%$ 												
	Black	V-													
Signal cable	Red	Actuator extends	Connect Red to positive (V+) to extend, input current <10mA.												
	Black	Actuator retracts	Connect Black to positive (V+) to retract, input current <10mA.												
	Yellow	Hall 2 output	High = 10.8V ($\pm 0.6V$), I _{max} 12.7mA Low = GND Hall signal data: <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>Actuator extends</p> </div> <div style="text-align: center;">  <p>Actuator retracts</p> </div> </div>												
	Blue	Hall 1 output	Resolution: <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Gear ratio</th> <th>Resolution (Pulse/mm)</th> </tr> </thead> <tbody> <tr> <td>05</td> <td>1.0570</td> </tr> <tr> <td>10</td> <td>1.7601</td> </tr> <tr> <td>15</td> <td>2.9552</td> </tr> <tr> <td>20</td> <td>3.9028</td> </tr> <tr> <td>30</td> <td>6.1603</td> </tr> </tbody> </table>	Gear ratio	Resolution (Pulse/mm)	05	1.0570	10	1.7601	15	2.9552	20	3.9028	30	6.1603
	Gear ratio	Resolution (Pulse/mm)													
	05	1.0570													
	10	1.7601													
15	2.9552														
20	3.9028														
30	6.1603														
White	GND	Signal GND. Both for Hall output and customer signal receiving device.													
Green	Extend EoS output	<ul style="list-style-type: none"> • The stroke limit switches are open collector circuit, and the arrival signal output is not potential free. A pull-up resistor should be applied in user's control circuit (see the wiring diagram on Page 25), the resistance of 10KΩ is recommended. • Recommended input voltage V_{cc} = 5~24V • Signal voltage during the stroke = GND (Normally closed circuit) • End of stroke signal voltage = V_{cc} (Open circuit) 													
Orange	Retract EoS output														

Notes:

- (1) To use the limit arrival signal, you must keep the power supply of the actuator, otherwise the signal will be lost.
- (2) Please ensure that unused wires are well insulated to avoid damaging the internal circuit of the actuator.
- (3) The EoS signal output wire must not shorted to GND to prevent the malfunction of limit switches.



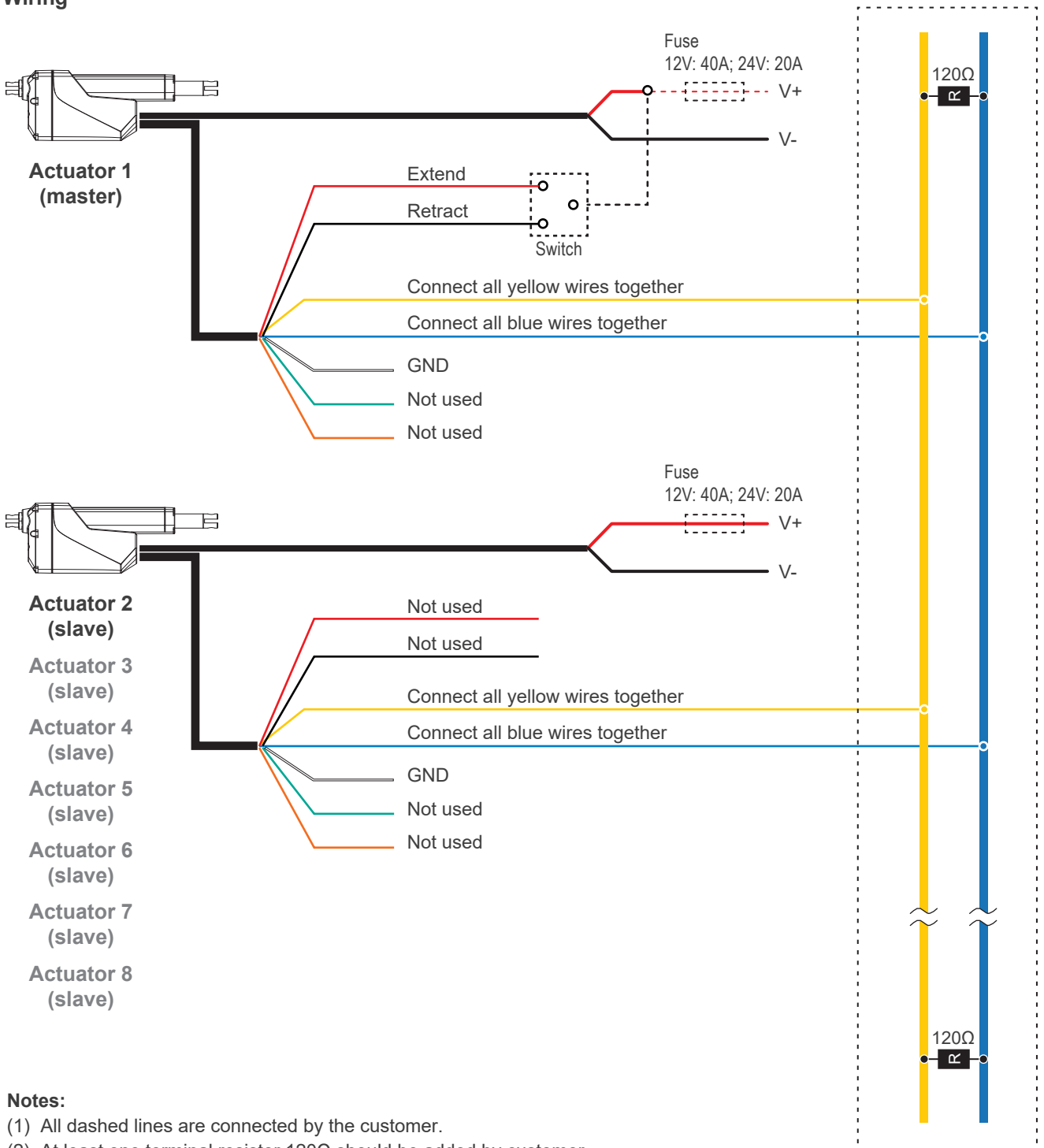
3.6.10 Control option SYL (Synchronous control)

The SYL option allows synchronous action of up to 8 actuators at a regulated synchronous speed.



- The polarity of the input DC power must be fixed in accordance with the specified connection method, and the polarity cannot be switched at any time.
- The battery or full-wave rectified DC power used must be within acceptable voltage range, otherwise the actuator will stop operating.

• **Wiring**



Notes:

- (1) All dashed lines are connected by the customer.
- (2) At least one terminal resistor 120Ω should be added by customer.
- (3) Please consult MOTECK for detailed setting instruction.



- **Wire definitions: SYL**

	Wire color	Definition	Description
Power cable	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 $\pm 10\%$
	Black	V-	
Signal cable	Red	Actuator extends	Connect Red to positive (V+) to extend, input current <10mA. Only master actuator needs to use this wire. The other slave actuators do not use it.
	Black	Actuator retracts	Connect Black to positive (V+) to retract, input current <10mA. Only master actuator needs to use this wire. The other slave actuators do not use it.
	Yellow	SYL signal	Connect all yellow wires together
	Blue	SYL signal	Connect all blue wires together
	White	GND	Connect to customer signal receiving device GND
	Green	Not used	
	Orange	Not used	

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



3.6.11 Control option J00 (CAN bus J1939) / N00 (CANopen)

CAN bus J1939 and CANopen are two popular higher-layer CAN (Controller Area Network) protocols. They are suitable for applications of agriculture, construction, and industrial automation.

The actuator with control option J00 / N00 has full stroke positioning and speed control function and can also return position, current, speed, and other status information through the CAN bus signal cable.

• Preparation

Provide an individual power supply for MK35 actuator, separate from the power supply of the CAN bus system (if this power supply exists). All command and feedback message of the J00 / N00 options, including protection message, are processed through CAN messages transmitted by the signal cable.

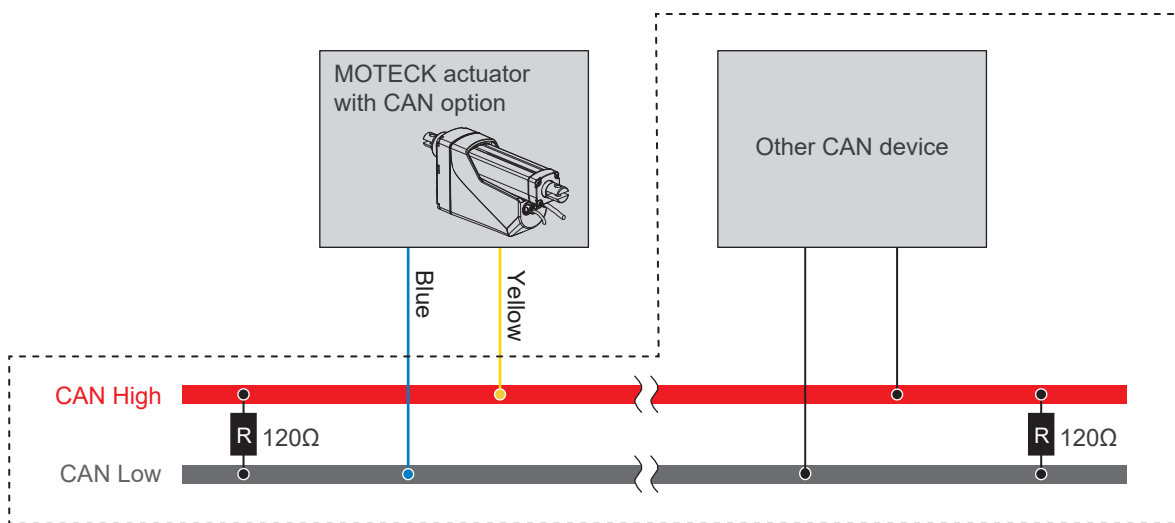
Please refer to the manual of MOTECK Actuator with CAN bus J1939 and the manual of MOTECK Actuator with CANopen for more detailed information and communication protocol.



- The polarity of the input DC power must be fixed in accordance with the specified connection method, and the polarity cannot be switched at any time.
- The battery or full-wave rectified DC power used must be within acceptable voltage range, otherwise the actuator will stop operating.
- The users who choose the J00 / N00 option must have already established or well prepared to establish the CAN bus J1939 or CANopen system to apply this actuator.

• Bus connection

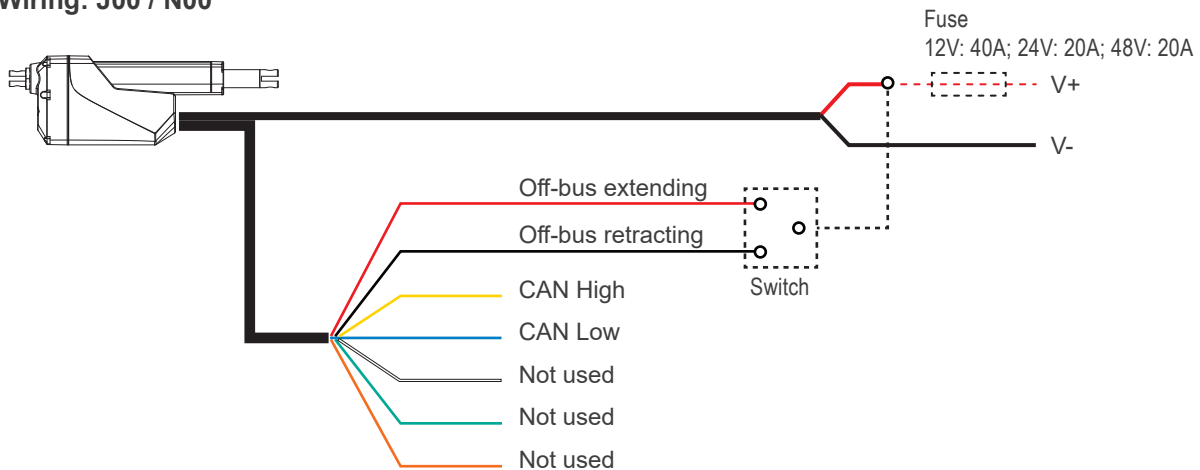
Please follow the wiring guidelines of ISO-11898-1/11898-2 standard. The two ends of the CAN High / CAN Low harness should be connected with a 120Ω terminal resistor, as shown in the figure below.



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



• Wiring: J00 / N00



Note: All dashed lines are connected by the customer.

• Wire definitions: J00 / N00

	Wire color	Definition	Description
Power cable	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 $\pm 10\%$
	Black	V-	
Signal cable	Red	Off-bus extending	Connect Red to positive (V+) to extend, input current <10mA.
	Black	Off-bus retracting	Connect Black to positive (V+) to retract, input current <10mA.
	Yellow	CAN High	
	Blue	CAN Low	
	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.

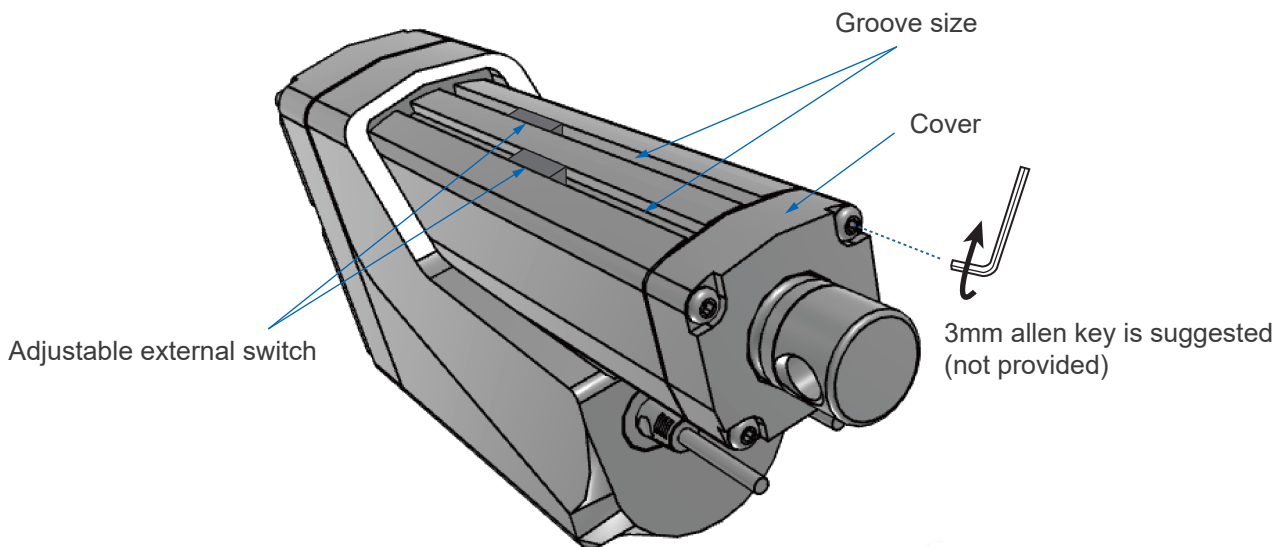
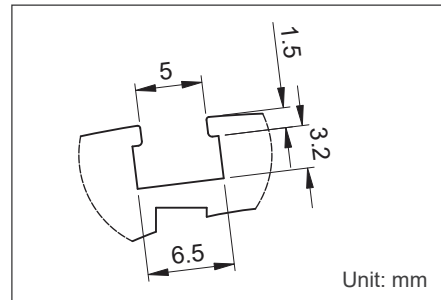


Before the off-bus operation, the dominance of the CAN bus and the off-bus operation should be well coordinated to prevent accidents caused by unanticipated commands from the CAN bus terminal. Operators must also properly wear personal protective equipment for safety.

4. Adjustable External switch

In addition to the MK35's built-in stroke limit switches, external switches can be installed to provide additional position feedback signals for customer's application.

1. Customer can choose 1 or 2 reed switches (Normally Open), which are pre-assembled in the outer tube groove at the factory, and then adjust them to the desired position.



2. The groove size is attached for customer to prepare suitable reed switches or solid state switches and install the switches by yourself. Just ask MOTEK to assemble the magnets at factory. Before installation, please use a 3mm allen key to remove the cover of the outer tube.



Remove the cover of the outer tube may damage the seals between tubes and the cover and the warranty void for ingress protection.

5. Troubleshooting

No.	Troubles	Possible Causes	Solution Guide
1	The actuator does not move and makes no sound.	The actuator is not getting the correct input voltage range.	Make sure to provide the correct input voltage for the actuator.
2	The actuator hummed and did not move.	The power supply is insufficient to drive the actuator and its load.	Make sure the power supply can provide enough current to drive the rated load.
3	The actuator moves slower or faster than expected.	The input voltage is too high or too low.	Make sure to provide the correct input voltage for the actuator.
4	The fuse is blown after the actuator is powered.	The fuse specification is incompatible with the consumption current of the actuator.	Check whether the specifications of the fuse used are correct and follow the recommendations in 3.5.3.
5	When the actuator moves for about 1 second, it stops automatically, and the same is true for repeated operations.	The actuator is overloaded or blocked by obstacles.	Do not repeat the operation again and again. Please check and remove possible obstructions before retrying, or reduce the weight of the actuator load.



If the above description does not solve the problem, please contact the seller for assistance.



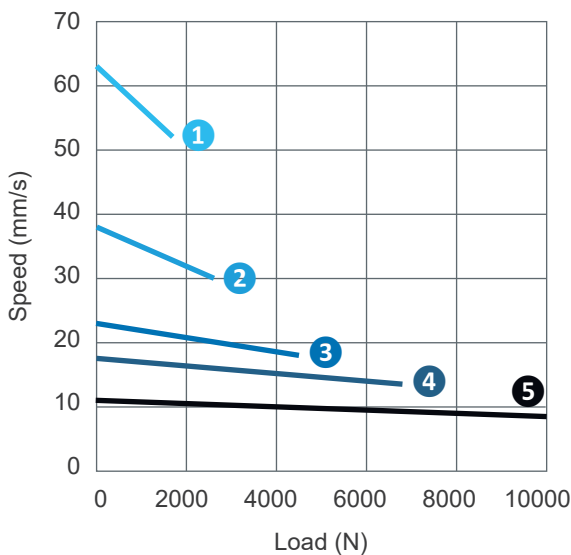
6. Performance and Options

6.1 Performance data

6.1.1 DXX options (Only available for 12/24V motors) / Signal control

No.	Gear ratio	Push / Pull Max. (N)	Typical speed (mm/s) ⁽¹⁾		Typical current (A) ⁽¹⁾						Duty cycle
			No load	Full load	No load			Full load			
					12V	24V	48V	12V	24V	48V	
1	5:1	1,700	63	52	3.0	1.5	1.0	17	8.5	4.5	25%
2	10:1	2,600	38	30	3.0	1.5	1.0	16	8.0	4.5	25%
3	15:1	4,500	23	18	3.0	1.5	1.0	17	8.5	4.5	25%
4	20:1	6,800	17.5	13.5	3.0	1.5	1.0	18	9.0	4.5	25%
5	30:1	10,000	11	8.5	3.0	1.5	1.0	17	8.5	4.5	15%

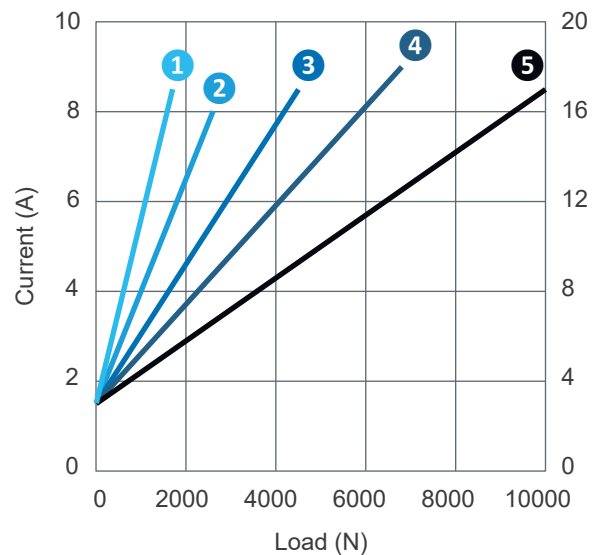
Speed VS. Load



24V DC

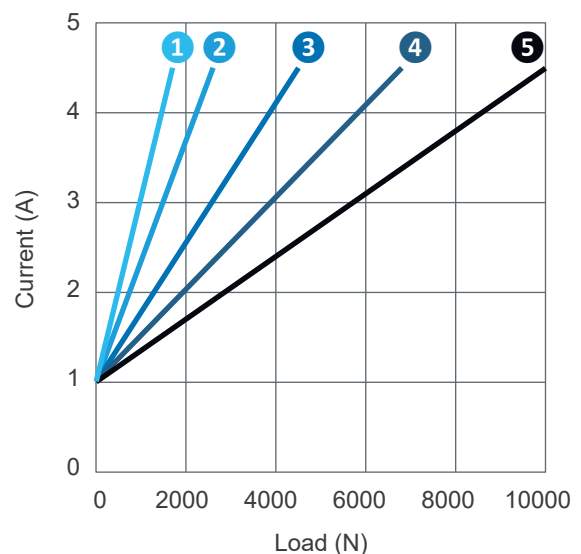
Current VS. Load

12V DC



48V DC

Current VS. Load



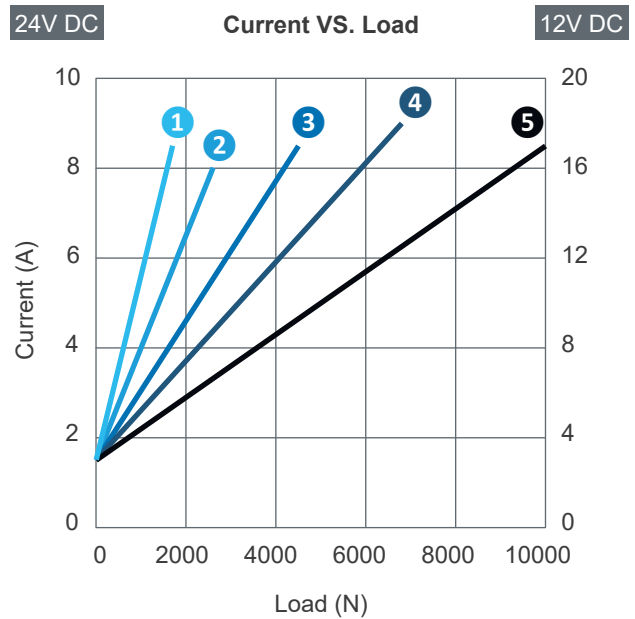
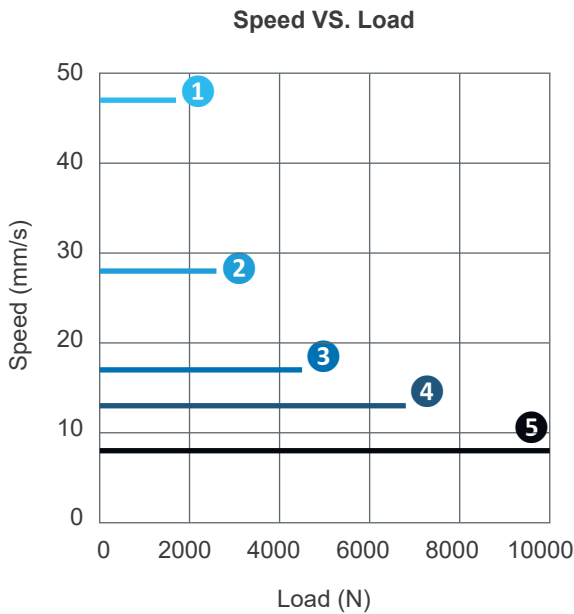
Note:

⁽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.



6.1.2 Synchronous control option

No.	Gear ratio	Push/Pull Max. (N)	Synchronous speed (mm/s) ⁽¹⁾	Typical current (A) ⁽²⁾				Duty cycle
				No load		Full load		
				12V	24V	12V	24V	
1	5:1	1,700	47	3.0	1.5	17	8.5	25%
2	10:1	2,600	28	3.0	1.5	16	8.0	25%
3	15:1	4,500	17	3.0	1.5	17	8.5	25%
4	20:1	6,800	13	3.0	1.5	18	9.0	25%
5	30:1	10,000	8	3.0	1.5	17	8.5	15%



Notes:

- ⁽¹⁾ The synchronous speed is regulated by internal control board. The actual speed may vary depending on the load level and distribution.
- ⁽²⁾ The 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.

• Max load VS. Stroke range

Max. load	Stroke range
≦ 1,700N	100~1000 (+2/-6mm)
≦ 2,600N	
≦ 4,500N	100~800 (+2/-6mm)
≦ 6,800N	100~600 (+2/-6mm)
≦ 10,000N	100~500 (+2/-6mm)



6.2 Ordering key

		MK35-24-G5B-30-A00-J00-2-2-0-0-0-1									
Input voltage	12: 12V DC 24: 24V DC 48: 48V DC ⁽¹⁾										
Motor and spindle type	G5B: 4500rpm / 5.08mm pitch / Ball screw										
Gear ratio	05: 5:1		15: 15:1		30: 30:1						
	10: 10:1		20: 20:1								
Stroke	XXX: 100~950mm (one step in every 50mm); A00=1000mm										
Control options	D00 : DC control, without positioning feedback. D0L : DC control + EoS DPL : DC control + Potentiometer + EoS DHL : DC control + Dual Hall effect sensors (NPN) + EoS D+L : DC control + Dual Hall effect sensors (PNP) + EoS S0L : Low current signal control + EoS SPL : Low current signal control + Potentiometer + EoS SHL : Low current signal control + Dual Hall effect sensors (NPN) + EoS SYL : Synchronous control J00 : CAN bus J1939 N00 : CANopen										
Front connector (Refer to Page 6)	2, 4, 5, 6, 7, 8, A, B										
Rear connector (Refer to Page 7)	2, 4, 5, 6, 7, 8, A										
Connector orientation	0: 0° (Standard) 9: 90° (Front and rear connectors shown in standard 0°)										
External switch	0: None (Standard)				R: Adjustable reed switch x1						
	M: Only nut magnets installed				S: Adjustable reed switches x2						
Reserved	0										
Cable length ⁽²⁾	1: 500mm straight		5: 1500mm straight			7: 3000mm straight					

Notes:

⁽¹⁾ Only available for control options S0L / SPL / SHL / J00 / N00

⁽²⁾ The wiring harness is divided into power cable and signal cable, equal in length, with the bare wires at both ends are tinned.
The D00 option only has a power cable but no signal cable.



For more information about control options J00 / N00, please refer to < Manual of MOTECK Actuator with CAN bus J1939 > and < Manual of MOTECK Actuator with CANopen > on Moteck official website.



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