

# MA6

## series



### Product Segments

#### • Industrial Motion

The MA6 series linear actuator, designed by TiMOTION, offers exceptional water ingress protection, available with up to IP67 and IP68 ratings. With a maximum push/pull force of 8,000N, the MA6 is a robust yet agile solution for applications requiring heavy-duty performance and exceptional durability. Additionally, the MA6 has an optional T-Smart version. Embedded with a driver board, the MA6 allows for easy integration with a variety of control interfaces, eliminating the need for an external control box.

The MA6 is available in two T-Smart alternatives:

##### 1) T-Smart Advanced

The actuator is controlled by an embedded PCBA, providing advanced functionality and real-time feedback.

The T-Smart Advanced configuration allows for synchronization of up to 8 actuators, as well as providing accurate position feedback through a variety of options (Hall, Hall-Pot., PWM).

\*TiMOTION's software program, PGMA, exclusively supports the T-smart Advanced configuration, providing the user autonomy to adjust many parameters such as speed, stroke limits, soft-stop, soft-start, and much more.

##### 2) T-Smart Bus Communication

The actuator is controlled by the customer's control system, such as their ECU or PLC.

- SAE J1939: This protocol provides seamless integration with CAN bus SAE J1939 interfaces, the standardized communication protocol commonly implemented in off-road vehicles and other industrial applications.

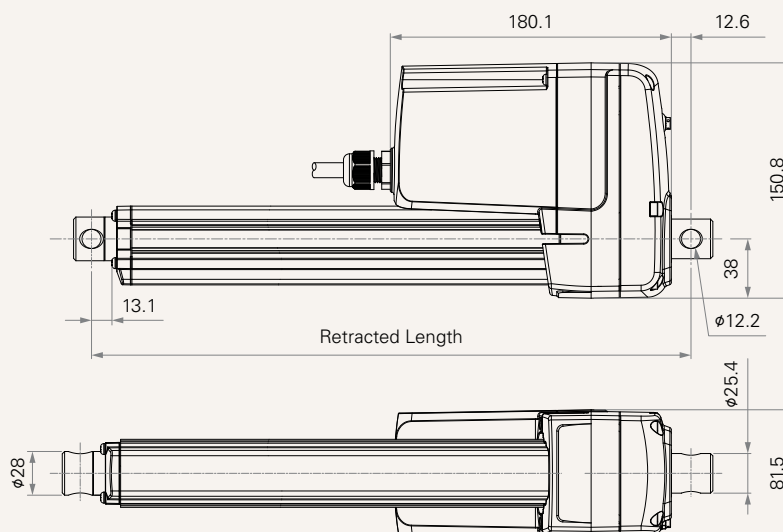
- Modbus: This is a serial communication protocol predominantly used in industrial automation and process control. The T-Smart Modbus protocol can be smoothly incorporated into existing industrial systems through its interface.

#### General Features

Max. load	8,000N (push/pull)
Max. speed at max. load	6.2mm/s
Max. speed at no load	64mm/s
Retracted length	≥ Stroke + 162mm
IP rating	IP69K
Stroke	25~1000mm
Output signals	Mechanical Pot., adjustable Reed switch, NPN Hall sensors
Voltage	12/24V DC; 12/24V DC (thermal switch)
Operational temperature range	-40°C~+85°C
Operational temperature range at full performance	+5°C~+45°C
Manual drive	

**Drawing**

Standard Dimensions  
(mm)



**Load and Speed**

CODE	Load (N)		Self Locking Force (N)	Duty Cycle	Typical Current (A)		Typical Speed (mm/s)	
	Push	Pull			No Load 24V DC	With Load 24V DC	No Load 24V DC	With Load 24V DC
<b>Motor Speed (5100RPM)</b>								
<b>B</b>	1000	1000	1300	25%	3.5	9.0	64.0	50.0
<b>C</b>	2000	2000	2600	25%	3.5	8.0	32.0	25.5
<b>D</b>	4000	4000	5200	25%	3.5	8.0	16.0	12.8
<b>E</b>	8000	8000	10400	25%	3.5	9.0	8.0	6.2

**Note**

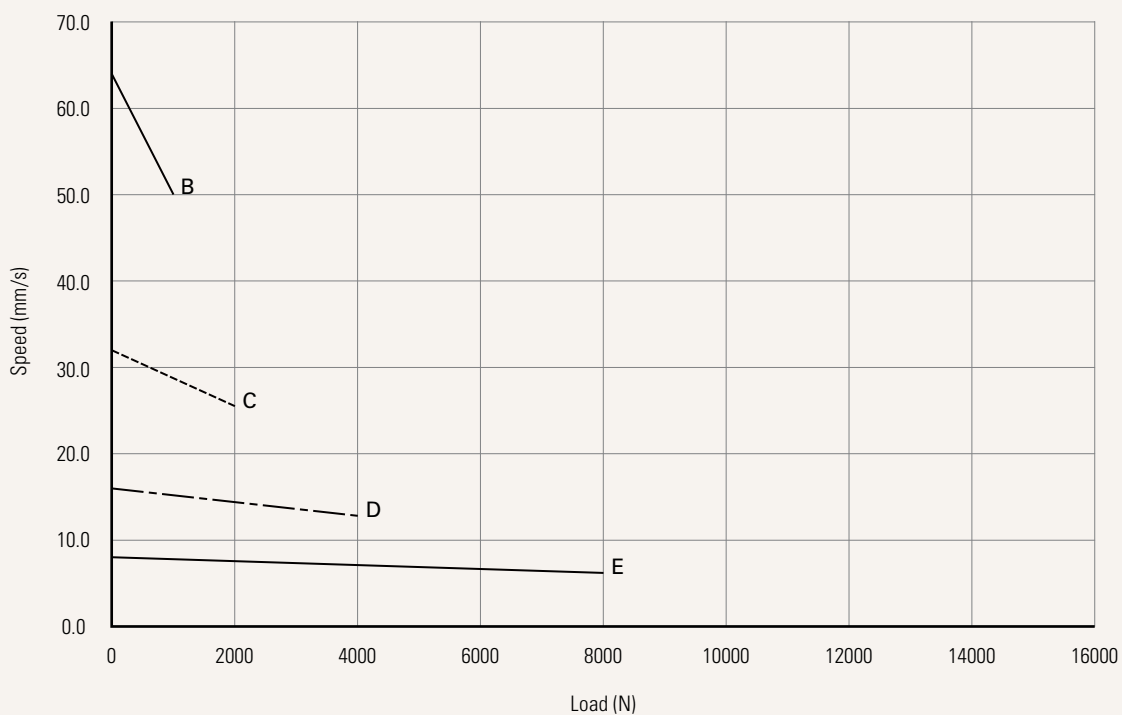
- 1 Please refer to the approved drawing for the final authentic value.
- 2 The current & speed in table are tested with 24V DC motor. With a 12V DC motor, the current is approximately twice the current measured in 24V DC; speed will be similar for both voltages.
- 3 The current & speed in table are tested when the actuator is extending under push load.
- 4 The current & speed in table and diagram are tested with a stable 24V DC power supply.
- 5 Without load, noise level  $\leq 78$ dB(A) (by TiMOTION test standard, ambient noise level  $\leq 36$ dB(A)).
- 6 Standard stroke: Min. 25mm, Max. please refer to the table below.

CODE	Load (N)	Max Stroke (mm)
<b>B, C</b>	$\leq 2000$	1000
<b>D</b>	$\leq 4000$	700
<b>E</b>	$\leq 8000$	300

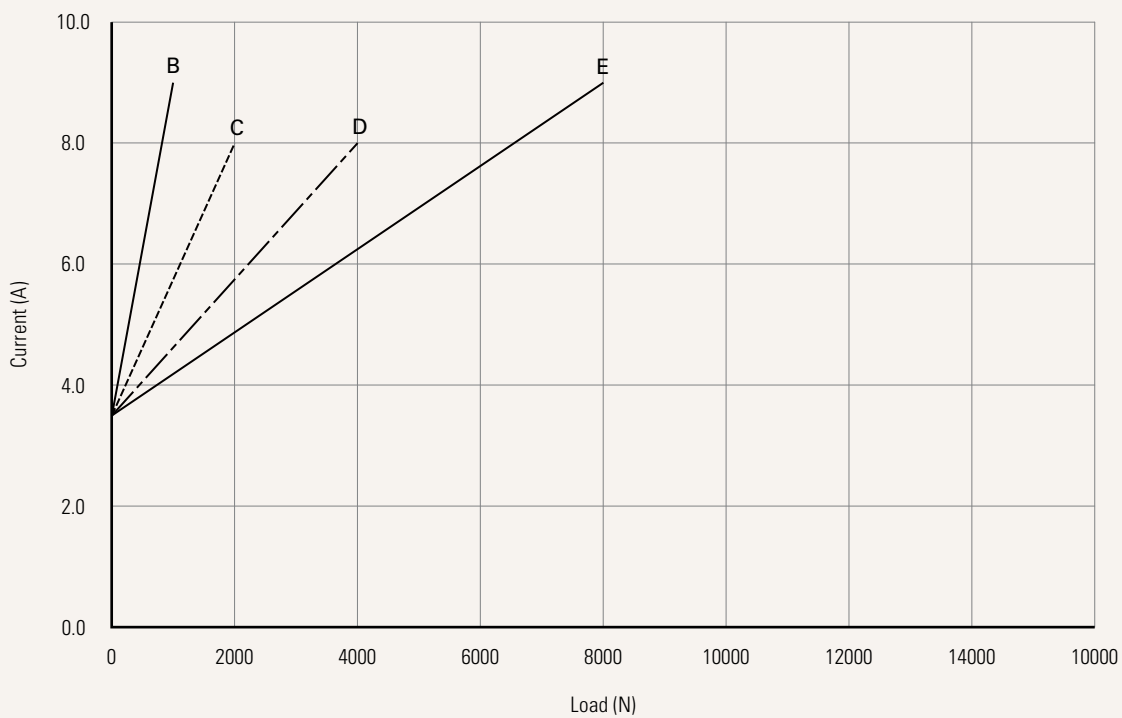
**Performance Data (24V DC Motor)**

Motor Speed (5100RPM)

Speed vs. Load



Current vs. Load



<b>Hardware System</b>	N = Normal	T = T-Smart		
<b>Voltage</b>	1 = 12V DC	2 = 24V DC	5 = 24VDC, thermal switch	6 = 12VDC, thermal switch
<b>Load and Speed</b>	<a href="#">See page 2</a>			
<b>Stroke (mm)</b>	<a href="#">See page 2</a>			
<b>Retracted Length (mm)</b>	<a href="#">See page 5</a>			
<b>Rear Attachment (mm)</b> <a href="#">See page 6</a>	1 = #45 Steel, slotless, hole 10.2 2 = #45 Steel, slotless, hole 12.2 3 = #45 Steel, slotless, hole 12.8 4 = #45 Steel, U clevis, slot 8.2, depth 12.5, hole 10.2 5 = #45 Steel, U clevis, slot 8.2, depth 12.5, hole 12.2	6 = #45 Steel, U clevis, slot 8.2, depth 12.5, hole 12.8 7 = #45 Steel, U clevis, slot 8.2, depth 15.0, hole 10.2 8 = #45 Steel, U clevis, slot 8.2, depth 15.0, hole 12.2 9 = #45 Steel, U clevis, slot 8.2, depth 15.0, hole 12.8 B = #SUS 316 Steel, U clevis, slot 8.2, depth 12.5, hole 10.2		
<b>Front Attachment (mm)</b> <a href="#">See page 6-7</a>	1 = #45 Steel, slotless, hole 10.2 2 = #45 Steel, slotless, hole 12.2 3 = #45 Steel, slotless, hole 12.8 7 = #45 Steel, U clevis, slot 8.2, depth 15.0, hole 10.2	8 = #45 Steel, U clevis, slot 8.2, depth 15.0, hole 12.2 9 = #45 Steel, U clevis, slot 8.2, depth 15.0, hole 12.8 B = #SUS 316 Steel, slotless, hole 10.2 K = Rod end bearing, hole 12.8		
<b>Direction of Rear Attachment (Counterclockwise)</b> <a href="#">See page 7</a>	1 = 0°	3 = 90°		
<b>Function of Limit Switches</b>	1 = Two limit switches cut off the actuator at end of stroke 2 = Two limit switches cut off the actuator at EOS + third one in between sends signal 3 = Two limit switches send signal at end of stroke (signal type: normally closed)	6 = Two limit switches cut off the actuator and send signal at end of stroke (signal type: normally open) T = Two limit switches send signal at end of stroke to T-Smart (T-Smart dedicated option)		
<b>Adjustable Reed Switch</b>	0 = Without 1 = Reed switch*1 (normal close)	2 = Reed switch*2 (normal close)	C = Reed switch*2, Molex 6p (T-Smart dedicated option, normal open)	
<b>Output Signal</b> <a href="#">See page 8-9</a>	0 = Without 1 = Mechanical Pot.	N = NPN Hall sensor*2	T = Hall sensor*2 for T-Smart (T-Smart dedicated option)	
<b>IP Rating</b>	1 = Without 6 = IP66M	7 = IP67 8 = IP68	9 = IP69K	
<b>Cable Exit</b>	1 = Single cable T = 1+1: 1* cable with cable gland + Molex 6P socket (T-Smart dedicated option)			
<b>A1 / P1 Connector (mm)</b> <a href="#">See page 7</a>	01 = Tinned leads, unsheathed wire 50, stripped wire 10			
<b>A1 / P1 Cable Length (mm)</b>	0500 = 500	1000 = 1000	1500 = 1500	2000 = 2000
<b>P2 Connector</b>	00 = Without 01 = Tinned leads, unsheathed wire 50mm, stripped wire 10mm (T-Smart dedicated option)	0P = Rubber seal plug (T-Smart dedicated option)		
<b>P2 Cable Length</b>	0000 = Without cable 1000 = 1000 (T-Smart dedicated option)	2000 = 2000 (T-Smart dedicated option)		
<b>P3 Connector</b>	00 = Without	01 = Tinned leads, unsheathed wire 50mm, stripped wire 10mm (T-Smart dedicated option)		
<b>P3 Cable Length</b>	0000 = Without cable 1000 = 1000 (T-Smart dedicated option)	2000 = 2000 (T-Smart dedicated option)		
<b>Vent Plug</b>	0 = Without	1 = With		
<b>Alternative</b>	N = Normal T = Advanced (proposal: TS18002)	J = SAE J1939 (250Kbps, proposal: PF22018) K = SAE J1939 (500Kbps, proposal: DS23021)	S = SAE J1939 (250kbps Secure Version, proposal: PF24032)	M = Modbus (proposal: PF22082)
<b>Packaging (mm<sup>2</sup>)</b>	0 = Sample packaging C = Standard package, US fumigated pallet (1219*1016) 1 = Standard package, EU fumigated pallet (1200*800) 2 = Standard package, EU fumigated pallet (1500*800)	E = Standard package, US plywood pallet (1219*1016) 5 = Standard package, EU plywood pallet (1200*800) 6 = Standard package, EU plywood pallet (1500*800)		

## Retracted Length (mm)

1. Calculate  $A+B+C = Y$
2. Minimum retracted length is  $\text{Stroke}+Y$

### Note

<sup>1</sup> Depending on the attachments, the motor cover might interfere with the customer's device when retracted length is between 225~318mm. Please confirm before placing order.

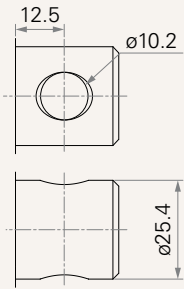
A.		
Front Attach.	Rear Attach.	
	1, 2, 3, 4, 5, 6, B	7, 8, 9
<b>1, 2, 3, B</b>	+162	+165
<b>7, 8, 9</b>	+175	+178
<b>K</b>	+185	+188

B.	
Stroke (mm)	Load & Speed Type (N)
	B, C, D, E
<b>25~150</b>	-
<b>151~200</b>	-
<b>201~250</b>	+10
<b>251~300</b>	+20
<b>301~350</b>	+30
<b>351~400</b>	+40
<b>401~450</b>	+50
<b>451~500</b>	+60
<b>501~550</b>	+70
<b>551~600</b>	+80
<b>601~650</b>	+90
<b>651~700</b>	+100
<b>701~750</b>	+110
<b>751~800</b>	+120
<b>801~850</b>	+130
<b>851~900</b>	+140
<b>901~950</b>	+150
<b>951~1000</b>	+160

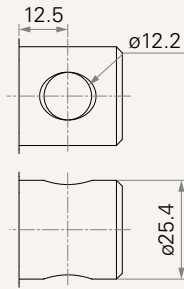
C.	
Output Signal	
0, N	-
<b>1</b>	+18

## Rear Attachment (mm)

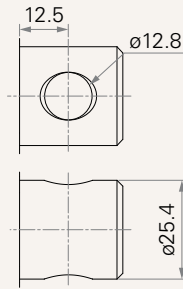
1 = #45 Steel, slotless, hole 10.2



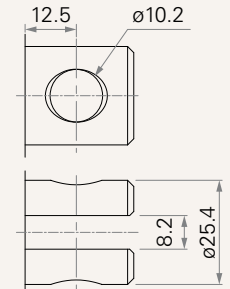
2 = #45 Steel, slotless, hole 12.2



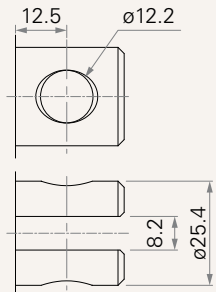
3 = #45 Steel, slotless, hole 12.8



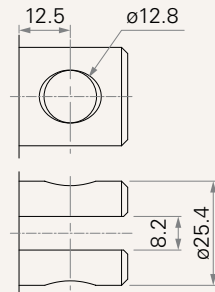
4 = #45 Steel, U clevis, slot 8.2, depth 12.5, hole 10.2



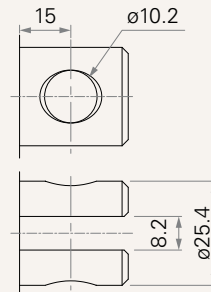
5 = #45 Steel, U clevis, slot 8.2, depth 12.5, hole 12.2



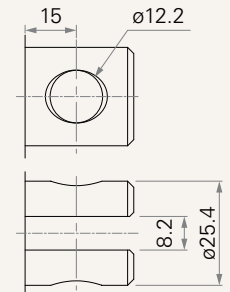
6 = #45 Steel, U clevis, slot 8.2, depth 12.5, hole 12.8



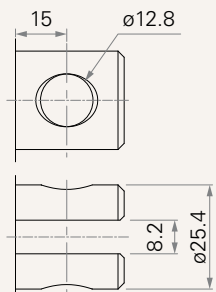
7 = #45 Steel, U clevis, slot 8.2, depth 15.0, hole 10.2



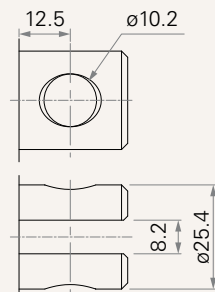
8 = #45 Steel, U clevis, slot 8.2, depth 15.0, hole 12.2



9 = #45 Steel, U clevis, slot 8.2, depth 15.0, hole 12.8

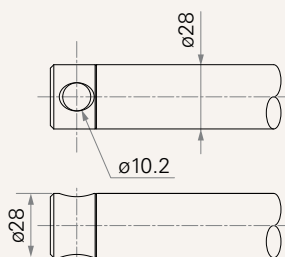


B = #SUS 316 Steel, U clevis, slot 8.2, depth 12.5, hole 10.2

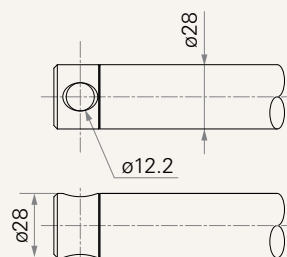


## Front Attachment (mm)

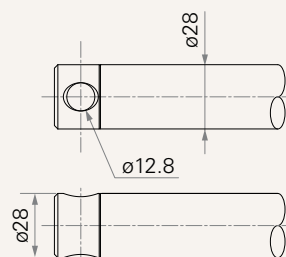
1 = #45 Steel, slotless, hole 10.2



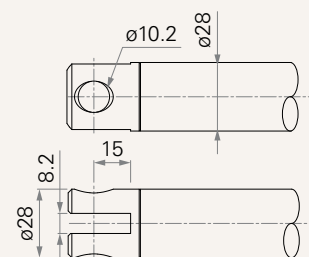
2 = #45 Steel, slotless, hole 12.2



3 = #45 Steel, slotless, hole 12.8

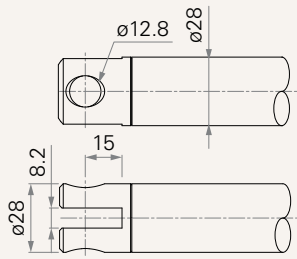


7 = #45 Steel, U clevis, slot 8.2, depth 15.0, hole 10.2

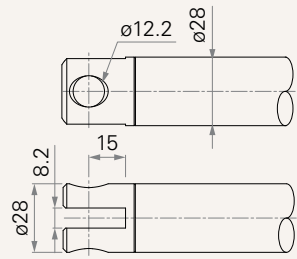


## Front Attachment (mm)

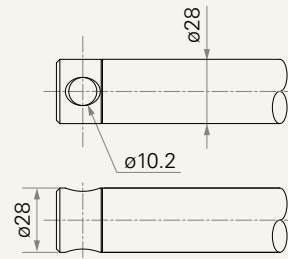
8 = #45 Steel, U clevis, slot 8.2, depth 15.0, hole 12.2



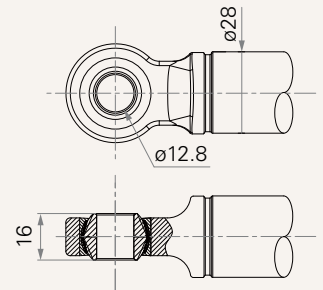
9 = #45 Steel, U clevis, slot 8.2, depth 15.0, hole 12.8



B = #SUS 316 Steel, slotless, hole 10.2

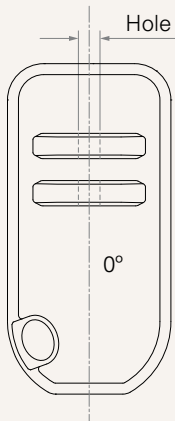


K = Rod end bearing, hole 12.8

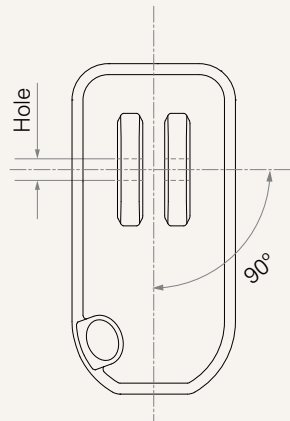


## Direction of Rear Attachment (Counterclockwise)

1 = 0°

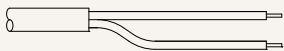


3 = 90°



## Connector (mm)

01 = Tinned leads, unsheathed wire  
50, stripped wire 10



## Wire Definition

Normal						
Port Number	Function of Limit Switches	Wire Color	Wire Gauge (AWG)	Output Signal		
				0. Without	1. Mechanical Pot.	N. Hall sensor*2
A1	1. Two Micro Switches Cut Off the Actuator	● RD	14	EXT+	EXT+	EXT+
		● BK	14	RET+	RET+	RET+
		● RD	20	-	V-out	+5V
		○ WH	20	-	V-in	S1
		● BK	20	-	GND	GND
		● BU	20	-	-	S2
		● BN	20	-	-	-
		● GY	20	-	-	-
		● OG	20	-	-	-
	● VT	20	-	-	-	
	2. Two Micro Switches Cut Off the Actuator + 3rd Micro Switch	● RD	14	EXT+	EXT+	EXT+
		● BK	14	RET+	RET+	RET+
		● RD	20	-	-	+5V
		○ WH	20	pin1 of 3rd switch	pin1 of 3rd switch	S1
		● BK	20	pin2 of 3rd switch	GND	GND
		● BU	20	-	pin2 of 3rd switch	S2
		● BN	20	-	V-in	pin1 of 3rd switch
		● GY	20	-	-	-
		● OG	20	-	V-out	pin2 of 3rd switch
	● VT	20	-	-	-	
	3. Two Micro Switches Send Signal	● RD	14	EXT+	EXT+	EXT+
		● BK	14	RET+	RET+	RET+
		● RD	20	COM	COM	+5V
		○ WH	20	EOS-extended	EOS-extended	S1
		● BK	20	-	GND	GND
		● BU	20	EOS-retracted	EOS-retracted	S2
		● BN	20	-	V-in	EOS-extended
		● GY	20	-	-	-
		● OG	20	-	V-out	EOS-retracted
	● VT	20	-	-	COM	
6. Two Limit Switches Cut Off the Actuator and Send Signal at End of Stroke (Signal Type: Normally Open)	● RD	14	EXT+	-	-	
	● BK	14	RET+	-	-	
	● RD	20	-	-	-	
	○ WH	20	EOS-extended	-	-	
	● BK	20	EOS-retracted	-	-	
	● BU	20	-	-	-	
	● BN	20	-	-	-	
	● GY	20	-	-	-	
	● OG	20	-	-	-	
● VT	20	-	-	-		

\* Limit switch #6 could not choose Pot. or Hall sensors. Please raise a new function proposal if needed.



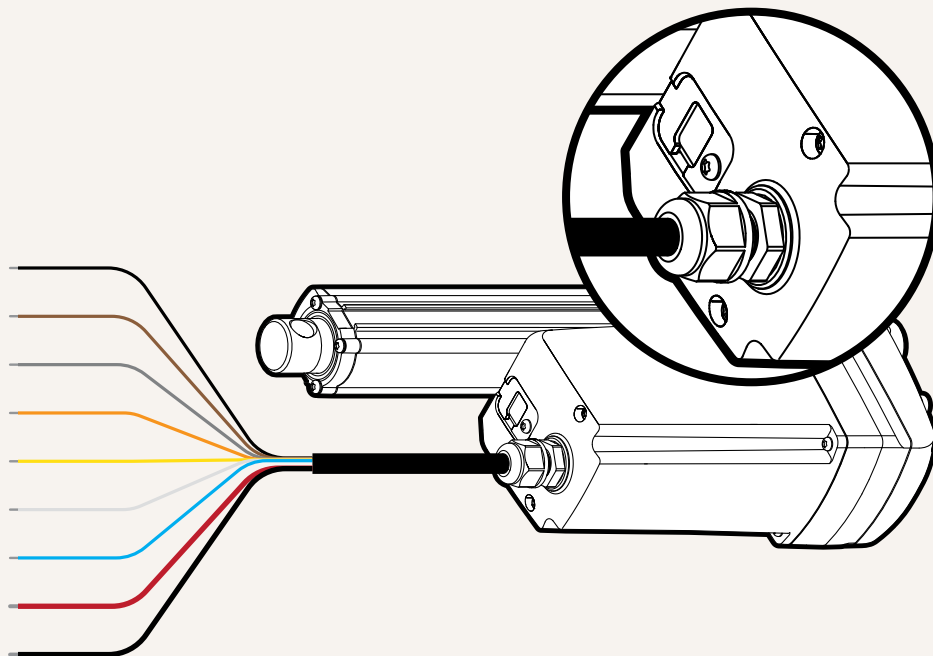
## Wire Definition

### #T\_Smart

#### Direct Cable Out, 1+1 Type: Military Connector (A1) + Molex 6P Connector (P2) (T-Smart Dedicated Option)

Port	Wire Color	AWG	Signal
A1	● RD	14	+Vcc
	● BK	14	Power ground
	● BN	20	Ctrl - Extend
	● GY	20	Ctrl - Retract
	● OG	20	EOS-extended
	● YE	20	EOS-retracted
	○ WH	20	Hall-Pot./ Hall A/ Commu. A
	● BU	20	PWM/ Hall B/ Commu. B
	● BK	20	Signal ground
	P2	● RD	20
○ WH		20	
● BU		20	
● BK		20	
● BN		20	
● GY		20	

\* Control motor movement: when Vcc wire is short circuit with Ctrl-Extend / Ctrl-retract wire.



## Terms of Use

The user is responsible for determining the suitability of TiMOTION products for a specific application. TiMOTION products are subject to change without prior notice.