

# MA2

## series



### Product Segments

- **Industrial Motion**

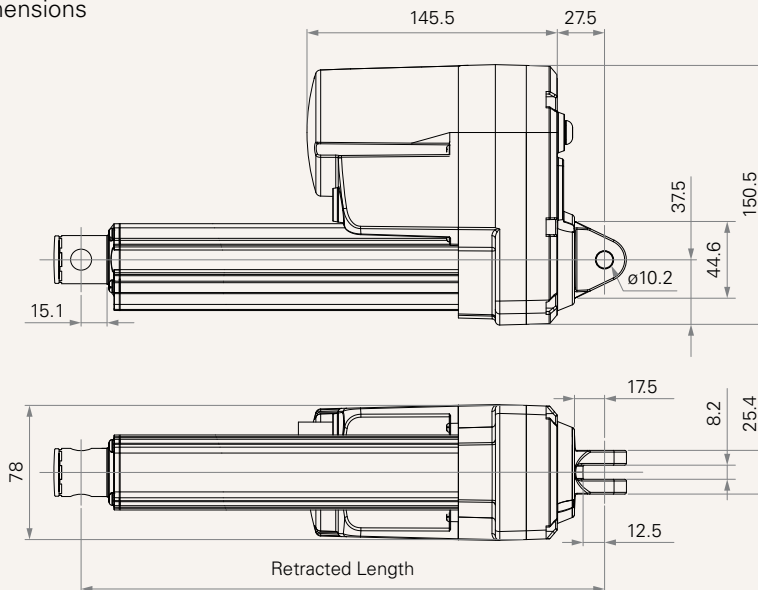
TiMOTION's MA2 series electric linear actuator was specifically designed for applications that face harsh working environments and require heavy-duty and durability. Its IP69K protection ensures it will withstand high-pressure water jets and the ingress of dust and other solid contaminants. The MA2 electric cylinder actuator also has optional Reed switches along the outer tube which allow users to adjust the stroke length. For improved control and accuracy of motion, the MA2 can be customized with many different feedback options depending on your application requirements. Example applications suitable for the MA2: Agricultural equipment such as spreaders, harvesters, grain handlers, combines, and tractors. Commercial and industrial applications such as commercial lawn mowers, scrubbers and sweepers, material handling equipment and livestock ventilation systems.

#### General Features

|   |   |
|---|---|
| Max. load   | 8,000N (push); 4,000N (pull)                                  |
| Max. speed at max. load                           | 5.5mm/s   |
| Max. speed at no load                             | 52.5mm/s  |
| Retracted length                                  | ≥ Stroke + 131mm  |
| IP rating   | IP69K   |
| Certificate                                       | UL73, EMC   |
| Stroke  | 25~1000mm   |
| Output signals                                    | NPN Hall sensors, Pot., Reed sensor on the outer tube         |
| Voltage   | 12 / 24 / 36 / 48V DC; 12 / 24 / 36 / 48V 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 Lock (N) | Duty Cycle | Typical Current (A) |                     | Typical Speed (mm/s) |                     |
|------------------------------|----------|------|---------------|------------|---------------------|---------------------|----------------------|---------------------|
|                              | Push     | Pull |               |            | No Load<br>24V DC   | With Load<br>24V DC | No Load<br>24V DC    | With Load<br>24V DC |
| <b>Motor Speed (5200RPM)</b> |          |      |               |            |                     |                     |                      |                     |
| <b>F</b>                     | 1000     | 1000 | 1300          | 25%        | 2.7                 | 6.8                 | 52.5                 | 44.2                |
| <b>G</b>                     | 2000     | 2000 | 2600          | 25%        | 2.4                 | 6.7                 | 25.5                 | 21.8                |
| <b>H</b>                     | 4000     | 4000 | 5200          | 25%        | 2.3                 | 6.9                 | 13.2                 | 11.0                |
| <b>J</b>                     | 6000     | 4000 | 8000          | 25%        | 2.0                 | 5.8                 | 6.6                  | 5.8                 |
| <b>K</b>                     | 8000     | 4000 | 8000          | 10%        | 2.0                 | 6.9                 | 6.6                  | 5.5                 |

## Note

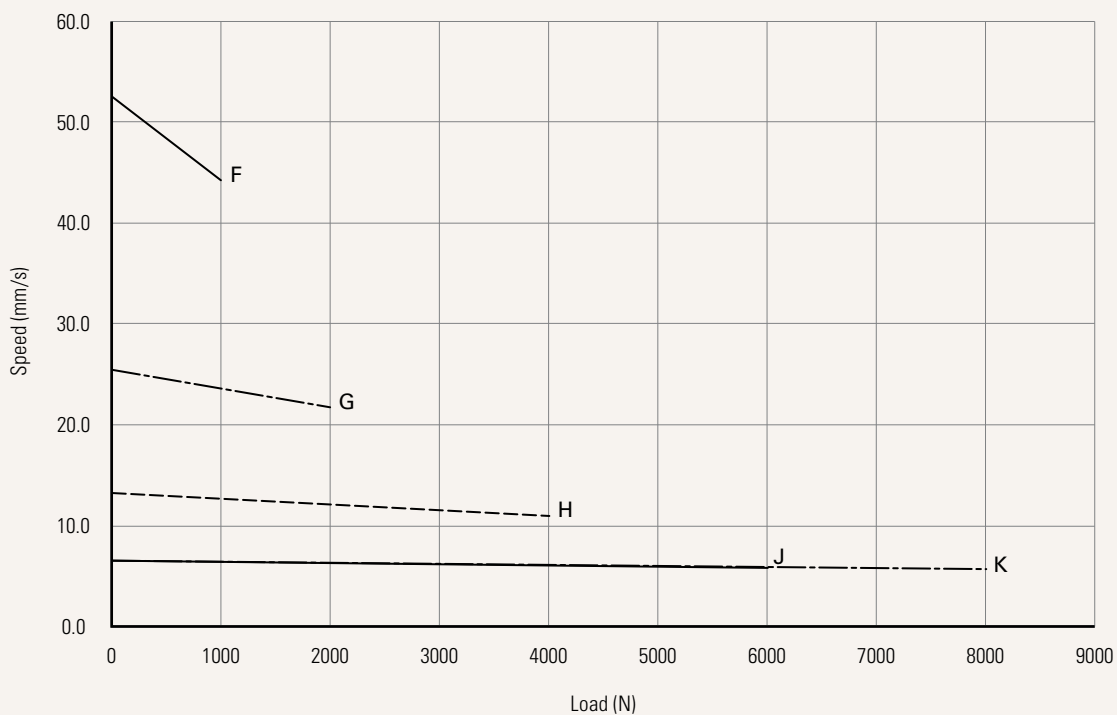
- 1 Please refer to the approved drawing for the final authentic value.
- 2 This self-locking force level is reached only when a short circuit is applied on the terminals of the motor. All the TiMOTION control boxes have this feature built-in.
- 3 The current & speed in table are tested with 24V DC motor. With a 12V DC motor, the current is approximately twice the current measured in 24V DC. With a 36V DC motor, the current is approximately two-thirds the current measured in 24V DC. Speed will be similar for all the voltages.
- 4 The current & speed in table are tested when the actuator is extending under push load.
- 5 The current & speed in table and diagram are tested with a stable 24V DC power supply.
- 6 Without load, noise level  $\leq 78$ dB(A) (by TiMOTION test standard, ambient noise level  $\leq 36$ dB(A))
- 7 Standard stroke: Min.  $\geq 25$ mm, Max. please refer to the table below.

| CODE              | Load (N)    | Max Stroke (mm) |
|-------------------|-------------|-----------------|
| <b>F, B</b>       | $\leq 1000$ | 1000            |
| <b>G, C</b>       | $\leq 2000$ | 800             |
| <b>H, J, D, E</b> | $\leq 6000$ | 600             |
| <b>K</b>          | $\leq 8000$ | 200             |

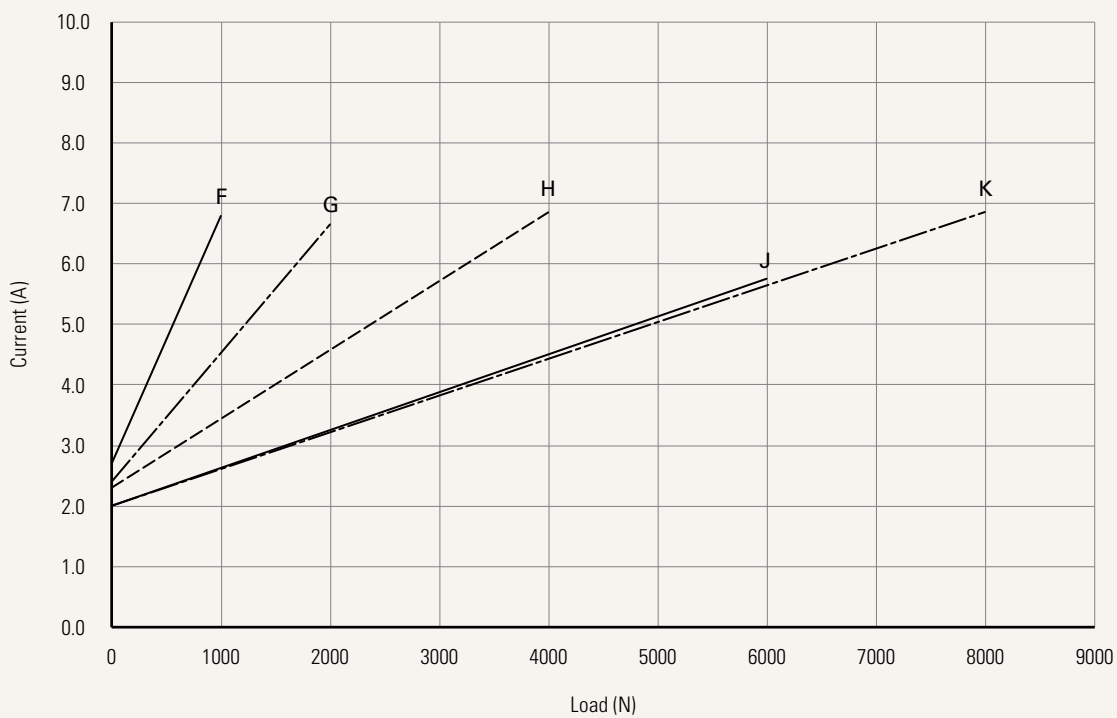
Performance Data (24V DC Motor)

Motor Speed (5200RPM)

Speed vs. Load



Current vs. Load



|  |   |                          |  |  |
|--|---|--------------------------|--|--|
| <b>Hardware System</b>                                 | N = Without driver board  |                          |  |  |
| <b>Voltage</b>   | 1 = 12V DC<br>2 = 24V DC  | 3 = 36V DC<br>4 = 48V DC | 5 = 24V DC, thermal switch<br>6 = 12V DC, thermal switch   | 7 = 36V DC, thermal switch<br>8 = 48V DC, 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>                            | 1 = Aluminum, U clevis, slot 8.2, depth 12.5, hole 10.2<br>2 = Aluminum, U clevis, slot 8.2, depth 15.0, hole 10.2<br><a href="#">See page 5</a>  |                          |  |  |
| <b>Front Attachment (mm)</b>                           | 1 = Steel, slotless, hole 10.2<br>2 = Steel, slotless, hole 12.2<br>3 = Steel, slotless, hole 12.8<br>4 = Aluminum, U clevis, slot 8.2, depth 15.0, hole 10.2   |                          | 5 = Aluminum, U clevis, slot 8.2, depth 15.0, hole 12.2<br>6 = Aluminum, U clevis, slot 8.2, depth 15.0, hole 12.8<br>K = Rod end bearing, hole 12.8   |  |
| <b>Direction of Rear Attachment (Counterclockwise)</b> | 1 = 0°  |                          | 3 = 90°<br><a href="#">See page 6</a>  |  |
| <b>Function of Limit Switches</b>                      | 1 = Two micro switches cut off the actuator at end of stroke<br>2 = Two micro switches cut off the actuator at end of stroke + third one in between sends signal<br>3 = Two micro switches send signal at end of stroke<br>6 = Two micro switches cut off the actuator at end of stroke + send signal |                          |  |  |
| <b>Adjustable Reed Switch</b>                          | 0 = Without   | 1 = Reed switch*1        | 2 = Reed switch*2  |  |
| <b>Output Signal</b>                                   | 0 = Without<br><a href="#">See page 7</a>   | 1 = Pot.                 | N = NPN Hall sensor*2  |  |
| <b>IP Rating</b>                                       | 1 = Without<br>2 = IP54   | 3 = IP66<br>6 = IP66M    | 8 = IP69K  |  |
| <b>Cable Exit</b>                                      | 1 = Single cable  |                          |  |  |
| <b>A1 / P1 Connector (mm)</b>                          | 01 = Tinned leads, unsheathed wire 50, stripped wire 4<br><a href="#">See page 7</a>  |                          |  |  |
| <b>A1 / P1 Cable Length (mm)</b>                       | 0500 = 500  | 1000 = 1000              | 1500 = 1500  | 2000 = 2000  |
| <b>P2 Connector (mm)</b>                               | 00 = Without  |                          |  |  |
| <b>P2 Cable Length (mm)</b>                            | 0000 = Without  |                          |  |  |
| <b>P3 Connector (mm)</b>                               | 00 = Without  |                          |  |  |
| <b>P3 Cable Length (mm)</b>                            | 0000 = Without  |                          |  |  |
| <b>Bus Interface</b>                                   | 0 = Without   |                          |  |  |
| <b>Packaging (mm<sup>2</sup>)</b>                      | 0 = Sample packaging<br>C = Standard package, US fumigated pallet (1219*1016 <sup>^2</sup> )<br>1 = Standard package, EU fumigated pallet (1200*800 <sup>^2</sup> )<br>2 = Standard package, EU fumigated pallet (1500*800 <sup>^2</sup> )  |                          | E = Standard package, US plywood pallet (1219*1016 <sup>^2</sup> )<br>5 = Standard package, EU plywood pallet (1200*800 <sup>^2</sup> )<br>6 = Standard package, EU plywood pallet (1500*800 <sup>^2</sup> ) |  |

## Retracted Length (mm)

1. Calculate  $A+B = Y$
2. Retracted length needs to  $\geq$  Stroke + Y

### A.

| Front Attachment | Rear Attachment |         |
|------------------|-----------------|---------|
|                  | 1               | 2, 3, 4 |
| 1, 2, 3          | +131            | +134    |
| 4, 5, 6          | +161            | +164    |
| K                | +178            | +181    |

### C.

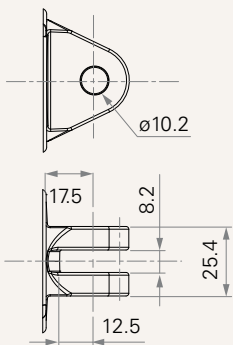
| Output Signal |     |
|---------------|-----|
| 0, 5          | -   |
| 1             | +20 |

### B.

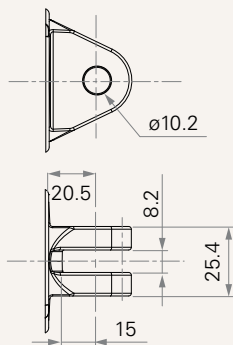
| Stroke (mm) | Load & Speed Type (N) |
|-------------|-----------------------|
|             | F, G, H, J, K         |
| 25~150      | -                     |
| 151~200     | -                     |
| 201~250     | +10                   |
| 251~300     | +20                   |
| 301~350     | +30 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

## Rear Attachment (mm)

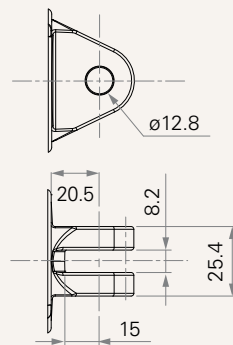
1 = Aluminum, U clevis, slot 8.2, depth 12.5, hole 10.2



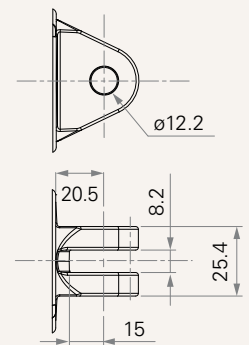
2 = Aluminum, U clevis, slot 8.2, depth 15.0, hole 10.2



3 = Aluminum, U clevis, slot 8.2, depth 15.0, hole 12.8

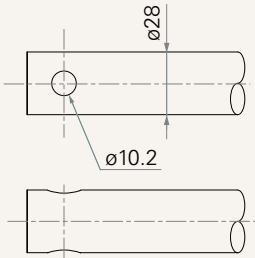


4 = Aluminum, U clevis, slot 8.2, depth 15.0, hole 12.2

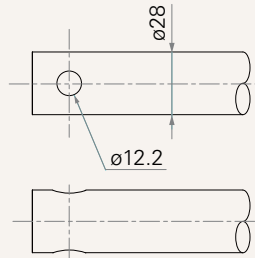


## Front Attachment (mm)

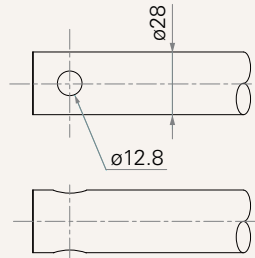
1 = Steel, slotless, hole 10.2



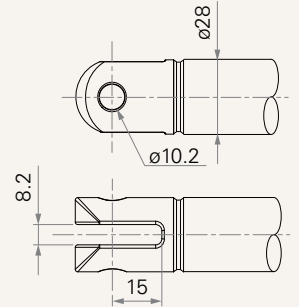
2 = Steel, slotless, hole 12.2



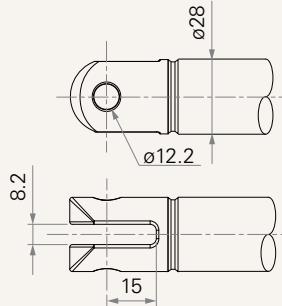
3 = Steel, slotless, hole 12.8



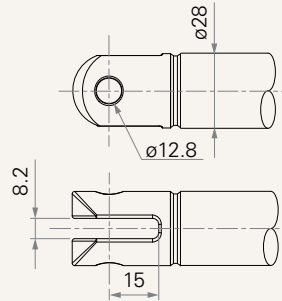
4 = Aluminum, U clevis, slot 8.2, depth 15.0, hole 10.2



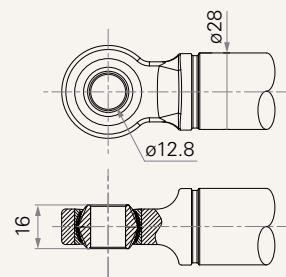
5 = Aluminum, U clevis, slot 8.2, depth 15.0, hole 12.2



6 = Aluminum, U clevis, slot 8.2, depth 15.0, hole 12.8

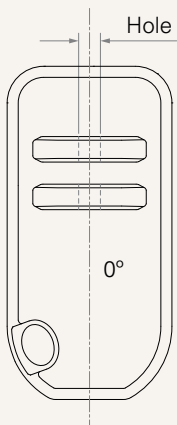


K = Rod end bearing, hole 12.8

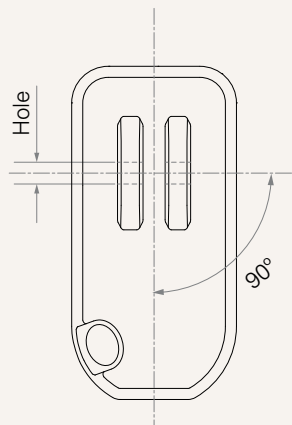


## Direction of Rear Attachment (Counterclockwise)

1 = 0°



3 = 90°

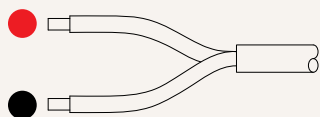


## Wire Definition

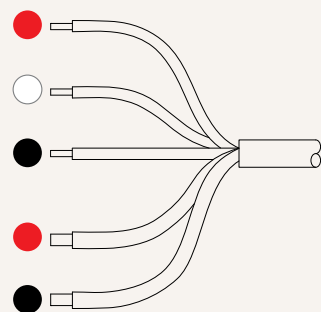
### DC motor

| Motor side | Wire Gauge (AWG) | Position Feedback |         |                      |
|------------|------------------|-------------------|---------|----------------------|
|            |                  | 0. Without        | 1. Pot. | N. NPN Hall sensor*2 |
| ● BK       | 20               | -                 | -       | GND                  |
| ● BU       | 20               | -                 | -       | S2                   |
| ○ WH       | 20               | -                 | -       | S1                   |
| ● RD       | 20               | -                 | -       | +5V                  |
| ● RD       | 14               | EXT+              | EXT+    | EXT+                 |
| ● BK       | 14               | RET+              | RET+    | -                    |
| ● RD       | 20               | -                 | pin1    | -                    |
| ○ WH       | 20               | -                 | pin2    | -                    |
| ● BK       | 20               | -                 | pin3    | -                    |

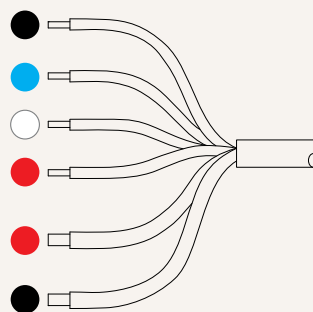
0 = Without



1 = Pot.



N = NPN Hall sensor\*2



## A1 / P1 Connector (mm)

01 = Tinned leads, unsheathed wire  
50, stripped wire 4



## Terms of Use

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