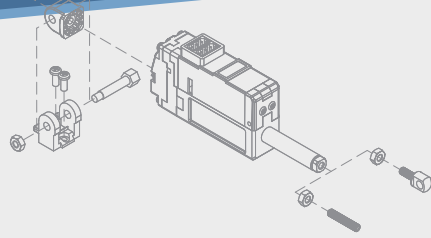


Force Control



Main Features

Force control

- Stall Force and current control based on current feedback
- Current feedback allows detection of objects and obstacles
- Possible to maintain constant force for a certain time (Applicable to Gripper, etc.)

Precision position & Dynamic speed control

- 30~50µm Unidirectional repeatability & Position feedback. (Varied by each stroke version. See spec chart.)
- Absolute position sensing via Potentiometer (No Calibration needed)
- 32Bit Micro controller, High resolution (4096) A/D converter
- Dynamic speed control (Fastest speed is default and is able to reduce speed without power loss)

Durability & Safety

- Heavy Duty Reliable 12V coreless motor with 7 ~ 13V input voltage range
- Metal alloy rod
- Engineering plastic case (27mm(1.06in) stroke version)
- Aluminum stroke case & engineering plastic motor case (40mm(1.57in) / 53mm(2.09in) / 90mm(3.54in))
- Current control allows longer life cycle & safer design
- Life-cycle Reference Data at rated load is on our homepage (Under 50% duty cycle recommended)
- Vertical (Z axis) use is possible due to mechanical Self-lock (Certain models are not applicable, see the model chart)
- Near perfect overload protection by calculation of cumulative current
- LED indicator shows voltage/overload error status and also shows simple circuit damage diagnosis

Easiness

- Compact size for space constraints
- Hassle-free, Built-in drive circuitor
- Daisy chain serial connection between servos
- Various mounting solutions
- Detachable and 90° rotatable hinge design (Patented)
- Various APIs / Libraries / Examples of programming languages (C# / C++ / Python / Java / Raspberry Pi / Arduino etc.)
- Dedicated PC Software (Parameter setting & simple motion testing) and PC USB Interface (IR-USB01) available (Optional)
- Paired with various controller types (PC / PLC / Arduino / Raspberry-Pi / RC Controller / Dedicated embedded board etc.)

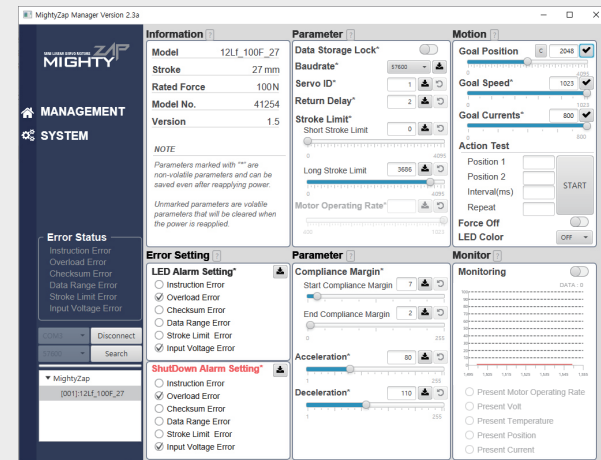
Variety and Line-Up

- Various Stroke options (27mm(1.06in)*, 40mm(1.57in), 53mm(2.09in), 90mm(3.54in))
- Various Rated Load options (12(2.7) to 100N(22.5lbf))
- Various Speed options (7.7(0.30) to 110mm/s(4.33in/s) at No load condition)
- Two types of data communication options (TTL or RS-485)
- IR Robot open protocol (Download from homepage) and Modbus RTU Protocol will be added later (Can be updated)
- TTL(Data comm.) or PWM(Pulse signal) is automatically recognized in TTL/PWM version
- *27mm(1.06in) stroke can be extended to 30mm(1.18in) using IR-USB01

Applications

- Medical device and Lab equipment
- Vending and game machines
- Robotics
- Automation (Factory / Home / Agriculture etc)
- Production and inspection jigs
- UAV (Fixed wing / Helicopter / Multicopter etc)
- DIY, Education, Hobby, etc

PC Software - MightyZAP Manager



- Setting various operation parameters & memory parameters
 - Baud rate, ID, Delay, Stroke limit, Compliance margin setting
 - Goal Speed, Goal Position, Goal Current, LED Alarm, Shutdown setting
 - Acceleration / Deceleration Setting
- Simple Motion Test
- System reset and Firmware update
- Motor Operating Rate, Voltage, Temperature, Position, Current real time monitoring
- Need optional PC USB Interface "IR-USB01" (Sold separately)
- Windows compatible mightyZAP manager PC software enables users to set various parameters & test motions. (Able to download from our website for free) (PC Software will be updated from time to time, so it is recommended for the user to download and update PC software properly.)

Standard Accessories



- 1 Hinge Base 1pc
- 2 Hinge 1pc
- 3 Hinge Shaft 1pc
- 4 Rod End Tip 1pc
- 5 M3 NUT 3pcs
- 6 M2.5x6 Screws 3pcs
- 7 Wire(F Version) : 4Pin Molex to Molex (RS-485)
- 8 Wire(PT Version) : 3Pin Molex to Molex (TTL)
- 9 Socket head M3.0x8 mounting bolt 3pcs (40 to 96mm Stroke line-up only)
- 10 Socket Set Screw 1pc
- 11 Wrench for M3 NUT 1pc

Optional Accessories

Extension Wire IR-EW01~04

We offer extension wires as below for application in your facilities.

- IR-EW01 : **1,000mm(39.37in)** length with **3pins TTL/PWM** Molex connectors (50-37-5033)
- IR-EW02 : **2,000mm(78.74in)** length with **3pins TTL/PWM** Molex connectors (50-37-5033)



IR-EW01

IR-EW02

- IR-EW03 : **2,000mm(78.74in)** length with **4pins RS-485** Molex connectors (51065-0400)
- IR-EW04 : **4,000mm(157.48in)** length with **4pins RS-485** Molex connectors (51065-0400)



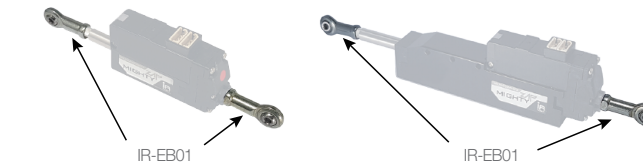
IR-EW03

IR-EW04

Optional Accessories

End Bearing IR-EB01

Mount mightyZAP servo on applications using this end-bearing for most optimal installation. Put it on the Rod-end(M3) and on the end of mightyZAP servo case (M2.5). Two end bearings (M3 and M2.5) to be packed in a set.



IR-EB01

IR-EB01

Metal Bracket IR-MB02

Mounting bracket IR-MB02 is dedicated for 26/27mm(1.02/1.06in) stroke line-up. Referring to the published drawings, user is also able to make this bracket at their end if necessary.



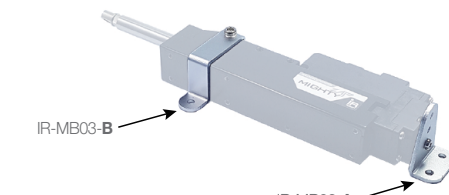
IR-MB02

Metal Bracket IR-MB03

Mounting bracket IR-MB03 is dedicated for IR-MB03 is for 40 to 96mm(1.57 to 3.78in) stroke line-up. Referring to the published drawings, user is also able to make this bracket at their end if necessary. 40 to 96mm(1.57 to 3.78in) stroke line-up can be installed through the tapped hole of the body without bracket according to application.

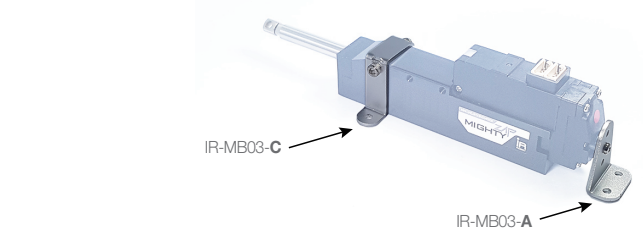


IR-MB03



IR-MB03-B

IR-MB03-A



IR-MB03-C

IR-MB03-A

Optional Accessories

PC USB Interface IR-USB01

The IR-USB01 is the interface board which connects mightyZAP servo with user's PC so that user is able to do various tasks shown below.

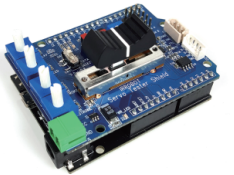
- Operation parameters and memory parameter setting
- Simple Motion Test
- System initialization and Firmware update
- Voltage, Load, Temperature, Present position monitoring



IR-USB01

Servo Tester Shield IR-ST501

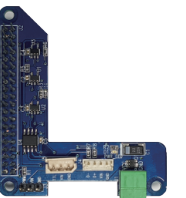
Control mightyZAP servo motions without PC software. Built with Arduino Leonardo and our own servo shield, user controls servo motor using Arduino API & libraries.



IR-ST501

Raspberry Pi HAT(Hardware Attached on Top) IR-ST502

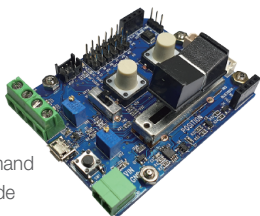
IR-ST502 is a Raspberry Pi add-On board which is compatible with Raspberry Pi B3 or Raspberry Pi Zero. With TTL/RS-485/PWM communication interface, power connector and GPIO pins, user is able to control mightyZAP servo on Raspberry Pi. API and Library can be downloaded from our web.



IR-ST502

EZ Controller IR-CT01

- mightyZAP controller/tester for customers who do not have their own controller
- Arduino based simple operation
- Built-in basic control program, User programmable (Arduino example provided)
- Built-in position setting dials, position command button switches and position command slide
- Controllable through external switch or voltage level signal
- 6 x I/O pins for analog/digital sensor connection
- External communication terminal for Bluetooth or Zigbee communication



IR-CT01

Specification Chart

Communication	Rated Load 12N(2.7lbf)	Rated Load 20N(4.5lbf)	Rated Load 17N(3.8lbf)		
	27mm(1.06in) Stroke	27mm(1.06in) Stroke	40mm(1.57in) Stroke	53mm(2.09in) Stroke	90mm(3.54in) Stroke
RS-485	12Lf-12F-27	12Lf-20F-27	12Lf-17F-40	12Lf-17F-53	12Lf-17F-90
TTL/PWM	12Lf-12PT-27	12Lf-20PT-27	12Lf-17PT-40	12Lf-17PT-53	12Lf-17PT-90
Applicable Max Load / Max. Speed(No Load)	24N / 110.0mm/s (5.4lbf / 4.33in/s)		40N / 80.0mm/s (9.0lbf / 3.15in/s)		
Stall force at Current (1.6A / 800mA / 100mA)	100N / 60N / 8N (22.5lbf / 13.5lbf / 1.8lbf)		100N / 60N / 8N (22.5lbf / 13.5lbf / 1.8lbf)		
Mechanical Self Lock (Z Axis Application)	Not Available				
Gear Ratio / Gear Type	10:1 / Engineering Plastic Gears				

Communication	Rated Load 35N(7.9lbf)	Rated Load 27N(6.1lbf)		
	27mm(1.06in) Stroke	40mm(1.57in) Stroke	53mm(2.09in) Stroke	90mm(3.54in) Stroke
RS-485	12Lf-35F-27	12Lf-27F-40	12Lf-27F-53	12Lf-27F-90
TTL/PWM	12Lf-35PT-27	12Lf-27PT-40	12Lf-27PT-53	12Lf-27PT-90
Applicable Max Load / Max. Speed(No Load)	70N / 28.0mm/s (15.7lbf / 1.10in/s)		54N / 28.0mm/s (12.1lbf / 1.10in/s)	
Stall force at Current (1.6A / 800mA / 100mA)	210N / 126N / 16.8N (47.2lbf / 28.3lbf / 3.8lbf)		160N / 96N / 12.8N (36.0lbf / 21.6lbf / 2.9lbf)	
Mechanical Self Lock (Z Axis Application)	Available			
Gear Ratio / Gear Type	10:1 / Engineering Plastic Gears			

Communication	Rated Load 55N(12.4lbf)	Rated Load 42N(9.4lbf)	
	27mm(1.06in) Stroke	40mm(1.57in) Stroke	53mm(2.09in) Stroke
RS-485	12Lf-55F-27	12Lf-42F-40	12Lf-42F-53
TTL/PWM	12Lf-55PT-27	12Lf-42PT-40	12Lf-42PT-53
Applicable Max Load / Max. Speed(No Load)	110N / 15.0mm/s (24.7lbf / 0.59in/s)		84N / 15.0mm/s (18.9lbf / 0.59in/s)
Stall force at Current (1.6A / 800mA / 100mA)	300N / 180N / 24N (67.4lbf / 40.5lbf / 5.4lbf)		240N / 144N / 19.2N (54.0lbf / 32.4lbf / 4.3lbf)
Mechanical Self Lock (Z Axis Application)	Available		
Gear Ratio / Gear Type	20:1 / 4 Metal & 2 Engineering Plastic Gears		

Communication	Rated Load 100N(22.5lbf)	Rated Load 78N(17.5lbf)	
	27mm(1.06in) Stroke	40mm(1.57in) Stroke	53mm(2.09in) Stroke
RS-485	12Lf-100F-27	12Lf-78F-40	12Lf-78F-53
TTL/PWM	12Lf-100PT-27	12Lf-78PT-40	12Lf-78PT-53
Applicable Max Load / Max. Speed(No Load)	200N / 7.7mm/s (45.0lbf / 0.30in/s)		156N / 7.7mm/s (35.0lbf / 0.30in/s)
Stall force at Current (1.6A / 800mA / 100mA)	600N / 360N / 48N (134.9lbf / 80.9lbf / 10.8lbf)		420N / 252N / 33.6N (94.4lbf / 56.7lbf / 7.6lbf)
Mechanical Self Lock (Z Axis Application)	Available		
Gear Ratio / Gear Type	50:1 / 4 Metal & 2 Engineering Plastic Gears		

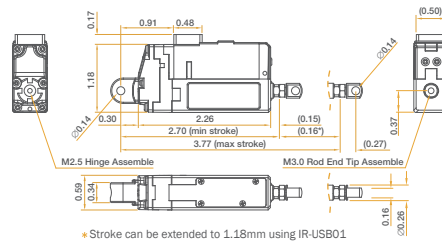
Common Specification

	Stroke	Unidirectional	Rod Type	Metal Alloy Rod		
Positional Accuracy	27/40mm(1.06/1.57in)	30µm(0.03mm)	Wire Harness	PWM/TTL(PT version) : Molex to Molex Type (Molex 50-37-5033, 3pins) / 200mm length, 0.08x60(22AWG) or RS-485(F version) : Molex to Molex Type (Molex 0510650400, 4pins) / 200mm length, 0.08x60(22AWG)G		
	53mm(2.09in)	40µm(0.04mm)				
	90mm(3.54in)	50µm(0.05mm)				
Mechanical Backlash	0.03mm (30µm)					
Motor Type / Voltage / Watt	Coreless / 12V / 26W		Data Communication / Protocol	RS-485 or TTL(PT version) / IR Robot open protocol		
Current Accuracy	±15% at Over 50mA		Pulse Signal / Pulse Range	PWM (PT version, Used in RC model hobby) / 900µs(Retracted)-1500µs(Center)-2100µs(Extended)		
Position Sensor	10KΩ linear Potentiometer		Operating Temperature	-10°C ~ 60°C		
Input Voltage Range	7 ~ 13V for 12V Motor		Ingress Protection	IP-54 (Dust & Water Tight)		
LED Indication	2 Error Indications (Input voltage, Overload)		Audible Noise	Approx. 50db at 1m		
Recommend Duty Cycle	At rated Load	At applicable Max Load	Size / Weight (Excluding rod-end & hinge)	27mm(1.06in)	57.4(L)x29.9(W)x15(H)mm / 49~52g	2.26x1.18x0.59in / 1.7~1.8oz
	Max 50%	Max 20%		40mm(1.57in)	86.9(L)x36(W)x18(H)mm / 96~99g	3.42x1.42x0.71in / 3.4~3.5oz
Current Consumption	Idle	Rated	Stall	53mm(2.09in)	111.5(L)x36(W)x18(H)mm / 124~127g	4.39x1.42x0.71in / 4.4~4.5oz
	20mA	380mA	800mA	1.6A	90mm(3.54in)	151.5(L)x36(W)x18(H)mm / Approx. 177g

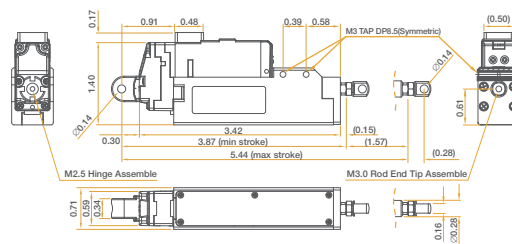
* Design and Specification can be changed without prior notice for further improvement.

Dimension (Coreless Motor Lineup)

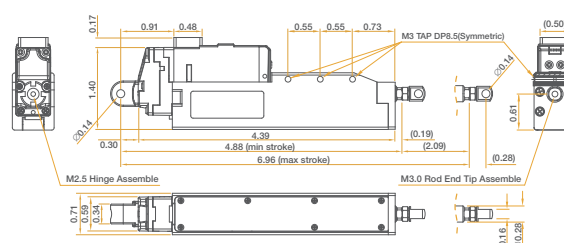
27mm(1.06in) Stroke Version



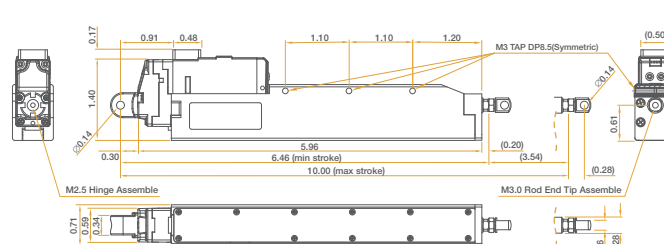
40mm(1.57in) Stroke Version



53mm(2.09in) Stroke Version



90mm(3.54in) Stroke Version



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MIGHTY
ZAP
MINI LINEAR SERVO ACTUATOR

- Micro Size
- Built-in Drive Circuit
- Heavy Duty 12V Coreless Motor
- Dynamic speed control
- Position control & Force control
- Data Communication & Feedback



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MINI, BUT MIGHTY.

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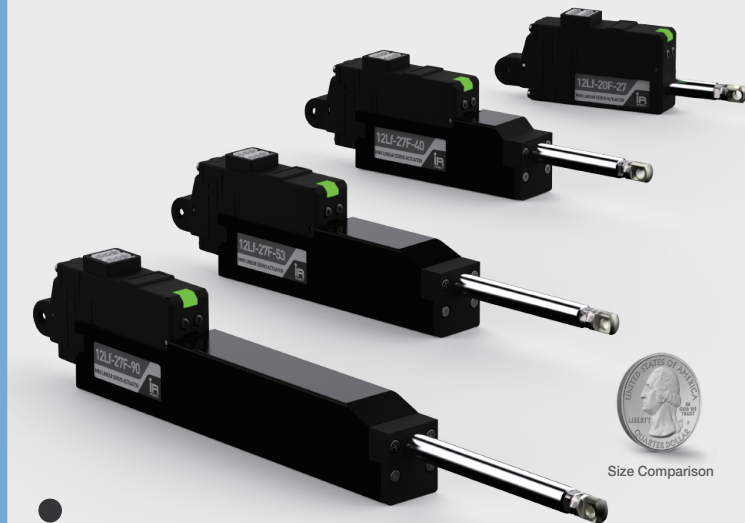
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ZAP
MIGHTY
MINI LINEAR SERVO ACTUATOR

MINI, BUT MIGHTY.

Force Control

- Micro Size
- Built-in Drive Circuit
- Heavy Duty 12V Coreless Motor
- Dynamic speed control
- Position control & Force control
- Data Communication & Feedback



Size Comparison

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