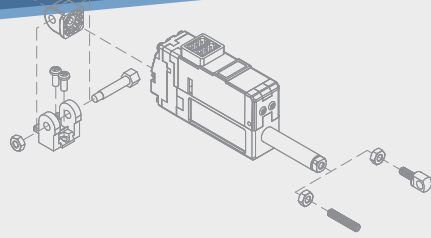


# Force Control



## 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 stroke version)
- Aluminum stroke case & engineering plastic motor case (40mm / 53mm / 90mm)
- 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 circuitry
- 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.)

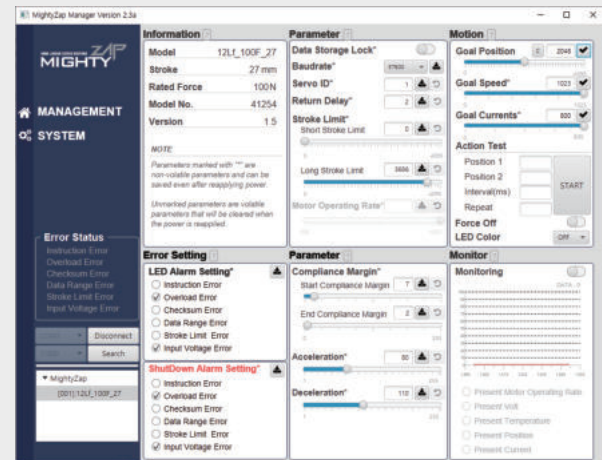
### Variety and Line-Up

- Various Stroke options (27mm\*, 40mm , 53mm, 90mm)
- Various Rated Load options (12 to 100N)
- Various Speed options (7.7 to 110mm/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 stroke can be extended to 30mm 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     | 7 Wire(F Version) : 4Pin Molex to Molex (RS-485)                         |
| 2 Hinge 1pc          | 8 Wire(PT Version) : 3Pin Molex to Molex (TTL)                           |
| 3 Hinge Shaft 1pc    | 9 Socket head M3.0x8 mounting bolt 3pcs (40 to 96mm Stroke line-up only) |
| 4 Rod End Tip 1pc    | 10 Socket Set Screw 1pc  |
| 5 M3 NUT 3pcs        | 11 Wrench for M3 NUT 1pc   |
| 6 M2.5x6 Screws 3pcs |  |

## Optional Accessories

### Extension Wire IR-EW01~04

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

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



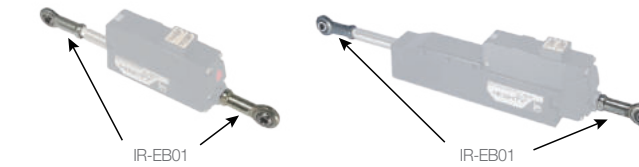
- IR-EW03 : **2,000mm** length with **4pins RS-485** Molex connectors (51065-0400)
- IR-EW04 : **4,000mm** length with **4pins RS-485** Molex connectors (51065-0400)



## 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.



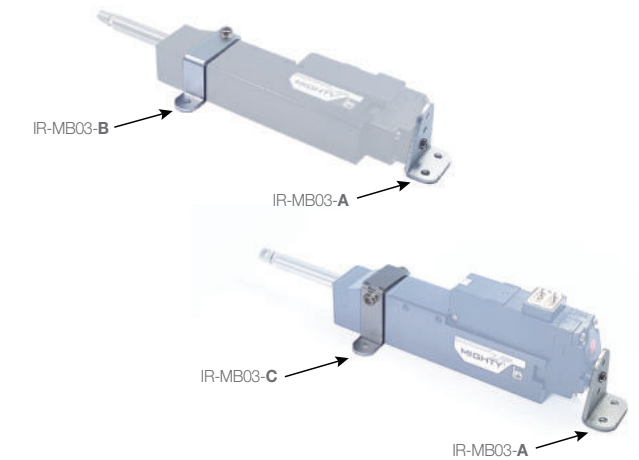
### Metal Bracket IR-MB02

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



### Metal Bracket IR-MB03

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



## 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



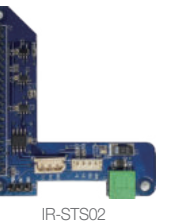
### Servo Tester Shield IR-ST01

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



### Raspberry Pi HAT(Hardware Attached on Top) IR-ST02

IR-ST02 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.



### EZ Controller IR-CT01

- Stand-alone easy mightyZAP servo controller
- Arduino base circuitry (But not Arduino shield compatible)
- Able to choose two types of control switches (two position push button or linear slide switch) for simple motion control
- Automatic motion can be programmed on PC with Sketch software (provide various examples)
- 3 Additional I/O Pins and 3 additional Analog Pins for connecting with of various analog and digital sensors
- Additional UART pin for Bluetooth or Zigbee communications
- Reliable Input battery connector for servo and controller



## Specification Chart

Communication	Rated Load 12N	Rated Load 20N	Rated Load 17N		
	27mm Stroke	27mm Stroke	40mm Stroke	53mm Stroke	90mm 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	40N / 80.0mm/s	34N / 80.0mm/s		
Stall force at Current (1.6A / 800mA / 100mA)	100N / 60N / 8N	120N / 72N / 9.6N	100N / 60N / 8N		
Mechanical Self Lock (Z Axis Application)	Not Available				
Gear Ratio / Gear Type	10:1 / Engineering Plastic Gears				

Communication	Rated Load 35N	Rated Load 27N		
	27mm Stroke	40mm Stroke	53mm Stroke	90mm 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	54N / 28.0mm/s		
Stall force at Current (1.6A / 800mA / 100mA)	210N / 126N / 16.8N	160N / 96N / 12.8N		
Mechanical Self Lock (Z Axis Application)	Available			
Gear Ratio / Gear Type	10:1 / Engineering Plastic Gears			

Communication	Rated Load 55N	Rated Load 42N	
	27mm Stroke	40mm Stroke	53mm 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	84N / 15.0mm/s	
Stall force at Current (1.6A / 800mA / 100mA)	300N / 180N / 24N	240N / 144N / 19.2N	
Mechanical Self Lock (Z Axis Application)	Available		
Gear Ratio / Gear Type	20:1 / 4 Metal & 2 Engineering Plastic Gears		

Communication	Rated Load 100N	Rated Load 78N	
	27mm Stroke	40mm Stroke	53mm 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	156N / 7.7mm/s	
Stall force at Current (1.6A / 800mA / 100mA)	600N / 360N / 48N	420N / 252N / 33.6N	
Mechanical Self Lock (Z Axis Application)	Available		
Gear Ratio / Gear Type	50:1 / 4 Metal & 2 Engineering Plastic Gears		

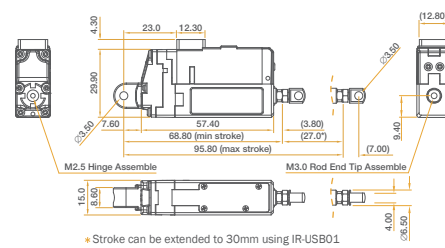
## Common Specification

Positional Accuracy	Stroke	Unidirectional	Rod Type	Metal Alloy Rod		
		27mm / 40mm	0.03mm (30µm)	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	0.04mm (40µm)				
	90mm	0.05mm (50µm)				
Mechanical Backlash	0.03mm (30µm)		Data Communication / Protocol	RS-485 or TTL(PT version) / IR Robot open protocol		
Motor Type / Voltage / Watt	Coreless / 12V / 26W		Pulse Signal / Pulse Range	PWM (PT version, Used in RC model hobby) / 900µs(Retracted)-1500µs(Center)-2100µs (Extended)		
Current Accuracy	±15% at Over 50mA		Operating Temperature	-10°C ~ 60°C		
Position Sensor	10KΩ linear Potentiometer		Ingress Protection	IP-54 (Dust & Water Tight)		
Input Voltage Range	7 ~ 13V for 12V Motor		Audible Noise	Approx. 50db at 1m		
LED Indication	2 Error Indications (Input voltage, Overload)		Size / Weight (Excluding rod-end & hinge)	27mm	57.4(L)x29.9(W)x15(H)mm / 49~52g	
Recommend Duty Cycle	At rated Load	At applicable Max Load		40mm	86.9(L)x36(W)x18(H)mm / 96~99g	
Current Consumption	Idle	Rated	Default	MAX	53mm	111.5(L)x36(W)x18(H)mm / 124~127g
					20mA	380mA

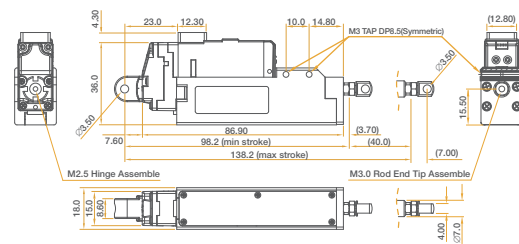
\* Design and Specification can be changed without prior notice for further improvement.

## Dimension (Coreless Motor Lineup)

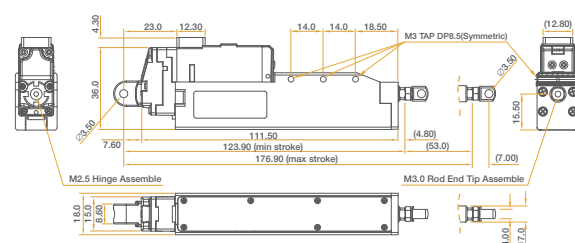
### 27mm Stroke Version



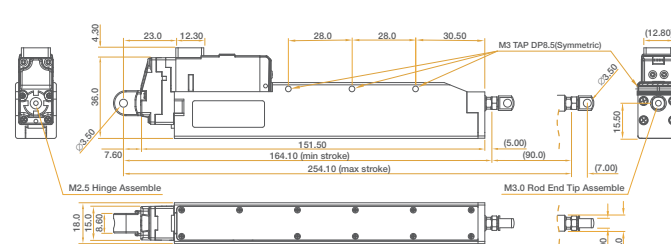
### 40mm Stroke Version



### 53mm Stroke Version



### 90mm Stroke Version



### Benefits for corporate customers

- Quantity Discount program
- Customization
- Instant technical support

In case that our standard actuator does not meet your requirement, Please feel free to contact us to inquire customization.



- 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.

## Force Control

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

