150:1 Micro Metal Gearmotor HPCB 12V with Extended Motor Shaft

Pololu item #: 3053 **70** in stock

Price break	Unit price (US$)
1	18.95
10	16.11
50	14.21

Quantity: 1 Add to cart

backorders *allowed* Add to wish list

This gearmotor is a miniature **high-power, 12 V** brushed DC motor with **long-life carbon brushes** and a **150.58:1** metal gearbox. It has a cross section of 10 × 12 mm, and the D-shaped gearbox output shaft is 9 mm long and 3 mm in diameter. This version also has a 4.5 × 1 mm **extended motor shaft**.

Key specs at 12 V: 200 RPM and 100 mA with no load, 40 oz-in (2.9 kg-cm) and 0.8 A at stall.

Select options: 150.58 :1 ▼ 0.8A stall @ 12V (HPCB 12V - carbon brush) ▼ extended motor shaft? Y ▼ Go ►

or .

Description **Specs (14)** **Pictures (20)** **Resources (12)** **FAQs (1)** On the blog (0)

Overview

These tiny brushed DC gearmotors are available in a wide range of gear ratios—from 5:1 up to 1000:1—and with five different motors: high-power 6 V and 12 V motors with long-life carbon brushes (HPCB), and high-power (HP), medium power (MP), and low power (LP) 6 V motors with shorter-life precious metal brushes. The 6 V and 12 V HPCB motors offer the same performance at their respective nominal voltages, just with the 12 V motor drawing half the current of the 6 V motor. The 6 V HPCB and 6 V HP motors are identical except for their brushes, which only affect the lifetime of the motor.

The HPCB versions (shown on the left in the picture below) can be differentiated from versions with precious metal brushes (shown on the right) by their copper-colored terminals. Note that the HPCB terminals are 0.5 mm wider than those on the other micro metal gearmotor versions (2 mm vs. 1.5 mm), and they are about 1 mm closer together (6 mm vs. 7 mm).

Versions of these gearmotors are also available with an additional 1 mm-diameter output shaft that protrudes from the rear of the motor. This 4.5 mm-long rear shaft rotates at the same speed as the input to the gearbox and offers a way to add an encoder, such as our **magnetic encoder for micro metal gearmotors** (see the picture on the right), to provide motor speed or position feedback.

With the exception of the 1000:1 gear ratio versions, all of the micro metal gearmotors have the same physical dimensions, so one version can be easily swapped for another if your design requirements change. Please see the **micro metal gearmotor comparison table** for detailed specifications of all our micro metal gearmotors. This dynamically-sortable table can help you find the gearmotor that offers the best blend of speed, torque, and current-draw for your particular application. A more basic comparison table is available below.

Rated Voltage	Motor Type	Stall Current @ Rated Voltage	No-Load Speed @ Rated Voltage	Approximate Stall Torque @ Rated Voltage	 Single-Shaft (Gearbox Only)	 Dual-Shaft (Gearbox & Motor)
12 V	high-power, carbon brushes **(HPCB)**	800 mA	6000 RPM	2 oz-in	**5:1 HPCB 12V**	**5:1 HPCB 12V dual-shaft**
			3000 RPM	4 oz-in	**10:1 HPCB 12V**	**10:1 HPCB 12V dual-shaft**
			1000 RPM	9 oz-in	**30:1 HPCB 12V**	**30:1 HPCB 12V dual-shaft**
			625 RPM	15 oz-in	**50:1 HPCB 12V**	**50:1 HPCB 12V dual-shaft**
			400 RPM	22 oz-in	**75:1 HPCB 12V**	**75:1 HPCB 12V dual-shaft**
			320 RPM	30 oz-in	**100:1 HPCB 12V**	**100:1 HPCB 12V dual-shaft**
			200 RPM	40 oz-in	**150:1 HPCB 12V**	**150:1 HPCB 12V dual-shaft**
			140 RPM	50 oz-in	**210:1 HPCB 12V**	**210:1 HPCB 12V dual-shaft**
			120 RPM	60 oz-in	**250:1 HPCB 12V**	**250:1 HPCB 12V dual-shaft**
			100 RPM	70 oz-in	**298:1 HPCB 12V**	**298:1 HPCB 12V dual-shaft**
			32 RPM	125 oz-in	**1000:1 HPCB 12V**	**1000:1 HPCB 12V dual-shaft**
			6000 RPM	2 oz-in	**5:1 HPCB 6V**	**5:1 HPCB 6V dual-shaft**
			3000 RPM	4 oz-in	**10:1 HPCB 6V**	**10:1 HPCB 6V dual-shaft**

6 V	high-power, carbon brushes **(HPCB)**	1600 mA	1000 RPM	9 oz-in	**30:1 HPCB 6V**	**30:1 HPCB 6V dual-shaft**
			625 RPM	15 oz-in	**50:1 HPCB 6V**	**50:1 HPCB 6V dual-shaft**
			400 RPM	22 oz-in	**75:1 HPCB 6V**	**75:1 HPCB 6V dual-shaft**
			320 RPM	30 oz-in	**100:1 HPCB 6V**	**100:1 HPCB 6V dual-shaft**
			200 RPM	40 oz-in	**150:1 HPCB 6V**	**150:1 HPCB 6V dual-shaft**
			140 RPM	50 oz-in	**210:1 HPCB 6V**	**210:1 HPCB 6V dual-shaft**
			120 RPM	60 oz-in	**250:1 HPCB 6V**	**250:1 HPCB 6V dual-shaft**
			100 RPM	70 oz-in	**298:1 HPCB 6V**	**298:1 HPCB 6V dual-shaft**
			32 RPM	125 oz-in	**1000:1 HPCB 6V**	**1000:1 HPCB 6V dual-shaft**
6 V	high-power **(HP)** *(same specs as 6V HPCB above)*	1600 mA	6000 RPM	2 oz-in	**5:1 HP 6V**	**5:1 HP 6V dual-shaft**
			3000 RPM	4 oz-in	**10:1 HP 6V**	**10:1 HP 6V dual-shaft**
			1000 RPM	9 oz-in	**30:1 HP 6V**	**30:1 HP 6V dual-shaft**
			625 RPM	15 oz-in	**50:1 HP 6V**	**50:1 HP 6V dual-shaft**
			400 RPM	22 oz-in	**75:1 HP 6V**	**75:1 HP 6V dual-shaft**
			320 RPM	30 oz-in	**100:1 HP 6V**	**100:1 HP 6V dual-shaft**
			200 RPM	40 oz-in	**150:1 HP 6V**	**150:1 HP 6V dual-shaft**
			140 RPM	50 oz-in	**210:1 HP 6V**	**210:1 HP 6V dual-shaft**
			120 RPM	60 oz-in	**250:1 HP 6V**	**250:1 HP 6V dual-shaft**
			100 RPM	70 oz-in	**298:1 HP 6V**	**298:1 HP 6V dual-shaft**
			32 RPM	125 oz-in	**1000:1 HP 6V**	**1000:1 HP 6V dual-shaft**
6 V	medium-power **(MP)**	700 mA	4400 RPM	1.5 oz-in		**5:1 MP 6V dual-shaft**
			2200 RPM	3 oz-in	**10:1 MP 6V**	**10:1 MP 6V dual-shaft**
			730 RPM	8 oz-in	**30:1 MP 6V**	**30:1 MP 6V dual-shaft**
			420 RPM	12 oz-in	**50:1 MP 6V**	**50:1 MP 6V dual-shaft**
			290 RPM	17 oz-in	**75:1 MP 6V**	**75:1 MP 6V dual-shaft**
			220 RPM	21 oz-in	**100:1 MP 6V**	**100:1 MP 6V dual-shaft**
			150 RPM	28 oz-in	**150:1 MP 6V**	**150:1 MP 6V dual-shaft**
			100 RPM	36 oz-in		**210:1 MP 6V dual-shaft**
			90 RPM	41 oz-in		**250:1 MP 6V dual-shaft**
			75 RPM	46 oz-in	**298:1 MP 6V**	**298:1 MP 6V dual-shaft**
			22 RPM	80 oz-in	**1000:1 MP 6V**	**1000:1 MP 6V dual-shaft**
6 V	low-power **(LP)**	360 mA	2500 RPM	1 oz-in	**5:1 LP 6V**	**5:1 LP 6V dual-shaft**
			1300 RPM	2 oz-in	**10:1 LP 6V**	**10:1 LP 6V dual-shaft**
			440 RPM	4 oz-in	**30:1 LP 6V**	**30:1 LP 6V dual-shaft**
			250 RPM	7 oz-in	**50:1 LP 6V**	**50:1 LP 6V dual-shaft**
			170 RPM	9 oz-in	**75:1 LP 6V**	**75:1 LP 6V dual-shaft**
			120 RPM	12 oz-in	**100:1 LP 6V**	**100:1 LP 6V dual-shaft**
			85 RPM	17 oz-in	**150:1 LP 6V**	**150:1 LP 6V dual-shaft**
			60 RPM	27 oz-in	**210:1 LP 6V**	**210:1 LP 6V dual-shaft**
			50 RPM	32 oz-in	**250:1 LP 6V**	**250:1 LP 6V dual-shaft**
			45 RPM	40 oz-in	**298:1 LP 6V**	**298:1 LP 6V dual-shaft**

			14 RPM	70 oz-in	1000:1 LP 6V	1000:1 LP 6V dual-shaft

Note: Stalling or overloading gearmotors can greatly decrease their lifetimes and even result in immediate damage. The recommended upper limit for instantaneous torque is 35 oz-in (2.5 kg-cm) for the 1000:1 gearboxes and 25 oz-in (2 kg*cm) for all the other gear ratios; we strongly advise keeping applied loads well under this limit. Stalls can also result in rapid (potentially on the order of seconds) thermal damage to the motor windings and brushes, especially for the versions that use high-power (HP and HPCB) motors; a general recommendation for brushed DC motor operation is 25% or less of the stall current.

In general, these kinds of motors can run at voltages above and below their nominal voltages; lower voltages might not be practical, and higher voltages could start negatively affecting the life of the motor.

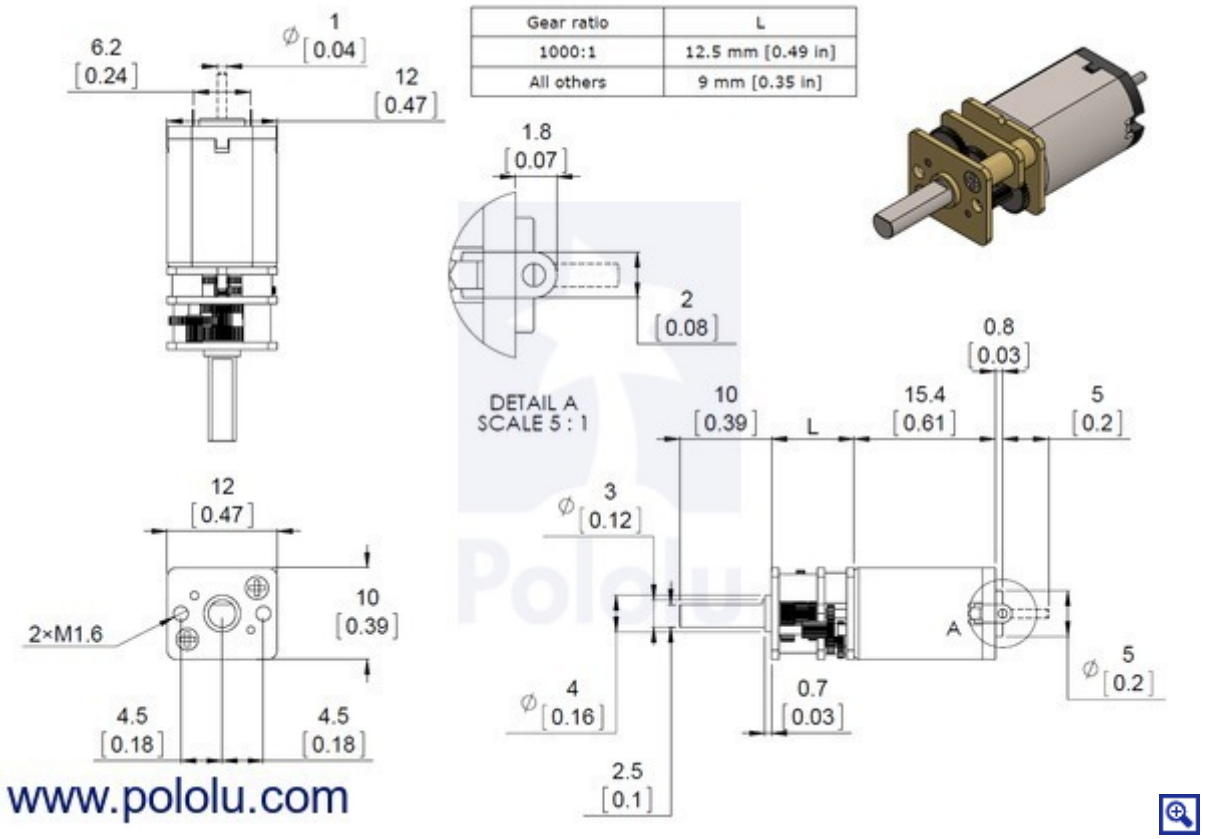
Details for item #3053

Exact gear ratio: $\frac{25 \times 32 \times 34 \times 35 \times 38}{12 \times 11 \times 14 \times 13 \times 10} \approx \mathbf{150.58:1}$

Gearmotor Dimensions

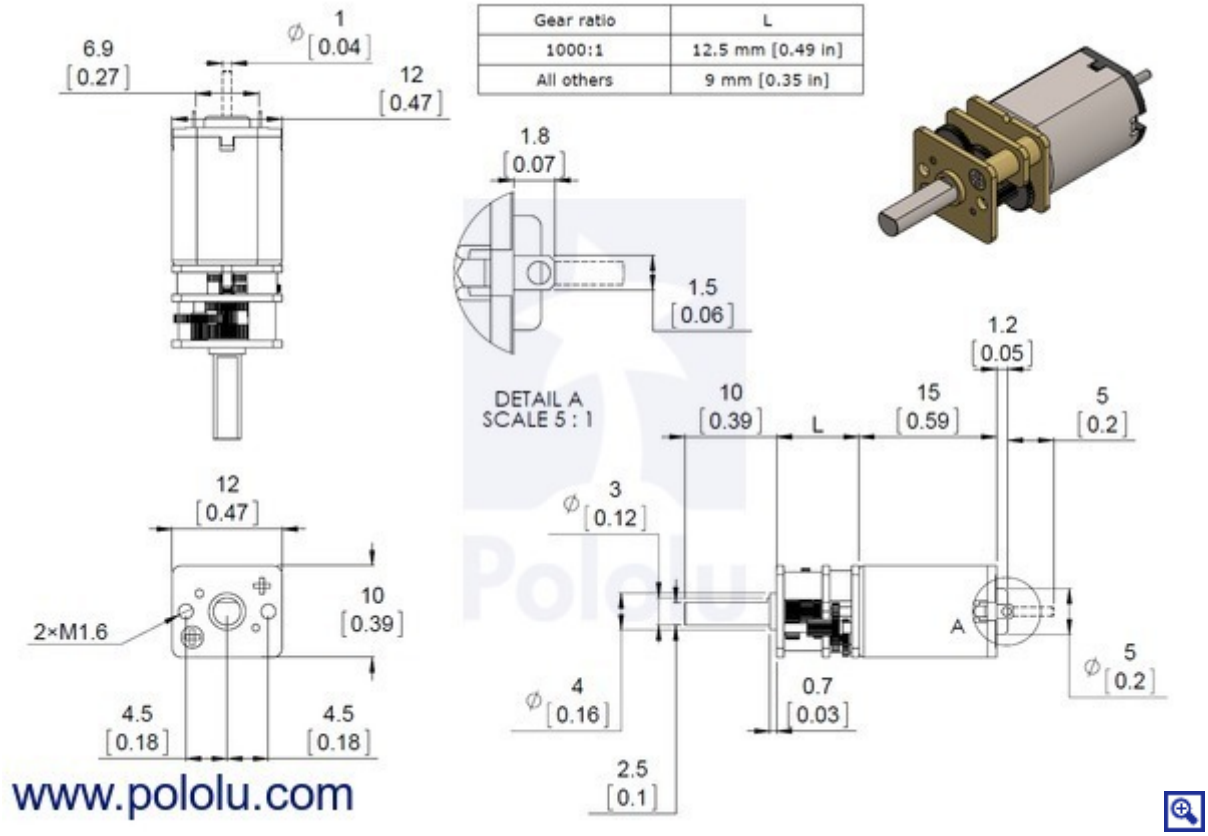
In terms of size, these gearmotors are very similar to Sanyo's popular 12 mm NA4S DC gearmotors, and gearmotors with this form factor are occasionally referred to as N20 motors. The versions with carbon brushes (HPCB) have slightly different terminal and end-cap dimensions than the versions with precious metal brushes, but all of the other dimensions are identical.

Dimensions of versions with carbon brushes (HPCB)



Dimensions of the Pololu micro metal gearmotors with carbon brushes (HPCB). Units are mm over [inches].

Dimensions of versions with precious metal brushes (LP, MP, and HP)



Dimensions of the Pololu micro metal gearmotors with precious metal brushes: low-power (LP), medium-power (MP), and high-power (HP). Units are mm over [inches].

These diagrams are also available as a **downloadable PDF** (262k pdf).

Motor Accessories

- **Wheels and hubs:** The micro metal gearmotor's output shaft matches our assortment of **Pololu wheels** and the **Solarbotics RW2i rubber wheel**. You can also use our **Pololu universal mounting hubs** to mount custom wheels and mechanism to the micro metal gearmotor's output shaft, and you can use our **12mm hex wheel adapter** to use this motor with many common hobby RC wheels.

Pololu wheel 32×7mm on a micro metal gearmotor.

Black Pololu 70×8mm wheel on a Pololu micro metal gearmotor.

A pair of Pololu universal aluminum mounting hubs for 3 mm diameter shafts.

12mm Hex Wheel Adapter for 3mm Shaft on a Micro Metal Gearmotor.

- **Mounting brackets:** Our **mounting bracket** (also available in **white**) and **extended mounting bracket** are specifically designed to securely mount the gearmotor while enclosing the exposed gears. We recommend the **extended** mounting bracket for wheels with recessed hubs, such as the Pololu wheel 42×19mm. Our micro metal gearmotors will also work with our **15.5D mm metal gearmotor bracket pair**.

Black micro metal gearmotor mounting bracket pair with included screws and nuts.

White micro metal gearmotor mounting bracket pair with included screws and nuts.

Pololu micro metal gearmotor bracket extended with micro metal gearmotor.

- **Quadrature encoders:** We offer several **quadrature encoders** that work with our micro metal gearmotors.

Magnetic Encoder Kit for Micro Metal Gearmotors assembled with ribbon cable wires.

Example of an installed micro metal gearmotor reflective optical encoder.

Encoder for Pololu wheel 42×19mm with wheel, motor, and bracket.

Note: The **HPCB** versions of our micro metal gearmotors are **not** compatible with our **#2590** and **#2591 optical encoders** or our **older #2598 magnetic encoders** (the terminals are too wide to fit through the corresponding holes in the encoder boards). However, they are compatible with our **newer #3081 magnetic encoders**.

- **Motor controllers and drivers:** We have a number of **motor controllers**, **motor drivers**, and **robot controllers** that make it easy to drive these micro metal gearmotors. For the 6 V micro metal gearmotors, consider the **DRV8838 single-channel motor driver carrier**, the **DRV8833 dual motor driver carrier**, and **DRV8835 dual motor driver carrier** (or **DRV8835 shield for Arduino**). For the 12 V micro metal gearmotors, consider the **MAX14870 single-channel motor driver carrier**, **DRV8801 single-channel motor driver carrier**, and **A4990 dual motor driver carrier** (or **A4990 shield for Arduino**).

DRV8838 Single Brushed DC Motor Driver Carrier.

Pololu A4990 Dual Motor Driver Shield for Arduino, bottom view.

DRV8835 dual motor driver carrier.

We also incorporate these motors into some of our products, including our **Zumo robot** and **3pi robot** :

Assembled Zumo 32U4 robot.

Pololu 3pi robot.

Selecting the Right Gearmotor

We offer a wide selection of metal gearmotors that offer different combinations of speed and torque. Our **metal gearmotor comparison table** can help you find the motor that best meets your project's requirements.

Some of the Pololu metal gearmotors.

Related products


Magnetic Encoder Pair Kit for Micro Metal Gearmotors, 12 CPR, 2.7-18V (HPCB compatible)


Optical Encoder Pair Kit for Micro Metal Gearmotors, 5V


Pololu 42×19mm Wheel and Encoder Set


Pololu Micro Metal Gearmotor Bracket Extended Pair


Pololu Micro Metal Gearmotor Bracket Pair - Black


Pololu 15.5D mm Metal Gearmotor Bracket Pair


Pololu Micro Metal Gearmotor Bracket Pair - White


Machine Screw: M1.6, 3mm Length, Phillips (6-pack)


Pololu Universal Aluminum Mounting Hub for 3mm Shaft, M3 Holes (2-Pack)


Pololu Universal Aluminum Mounting Hub for 3mm Shaft, #2-56 Holes (2-Pack)


12mm Hex Wheel Adapter for 3mm Shaft (2-Pack)

Pololu Wheel 70×8mm Pair - Red

Pololu 5" Robot Chassis RRC04A Solid Red

Pololu 22T Track Set

Pololu 30T Track Set

Solarbotics RW2i Wheel (internal set screw)

Pololu Simple Motor Controller 18v7 (Fully Assembled)

Pololu Qik 2s9v1 Dual Serial Motor Controller

DRV8833 Dual Motor Driver Carrier

DRV8838 Single Brushed DC Motor Driver Carrier

DRV8835 Dual Motor Driver Carrier

TB6612FNG Dual Motor Driver Carrier

Orangutan SVP-1284 Robot Controller (assembled)

Orangutan SV-328 Robot Controller

Baby Orangutan B-328 Robot Controller

26:1 Sub-Micro Plastic Planetary Gearmotor 6Dx16L mm

136:1 Sub-Micro Plastic Planetary Gearmotor 6Dx19L mm

Pololu 6V Step-Up Voltage Regulator U3V50F6

Zumo 32U4 Robot Kit (No Motors)

[Zumo Robot for Arduino, v1.2 (Assembled with 75:1 HP Motors)]

[Pololu 3pi Robot]

[Ceramic Capacitor 6-Pack 0.1uF 50V]

Related categories

[12V High-Power Carbon Brush (HPCB) Micro Metal Gearmotors]

[Micro Metal Gearmotors with Extended Motor Shafts]

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[3mm Shaft Gearmotors]

[25D mm Gearmotors]

[37D mm Gearmotors]