Barrett's history

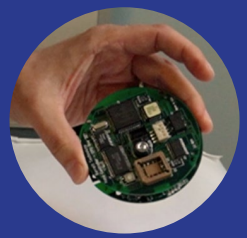
Bill Townsend

Barrett Founder & CEO

Pictured here in 1987, Bill co-invented the WAM® arm and the Puck® motor controller

The origins of the Puck® and Barrett Technology begin with Bill's pursuit of his PhD at the Massachusetts Institute of Technology Artificial Intelligence Laboratory (now called MIT CSAIL), funded in part by NASA. While there, Bill was initially discouraged from designing a robot intended to interact with people because of the perceived inherent danger posed by robots, which were all industrial at the time. Bill felt that by applying thoughtful design and human factors, such as natural backdrivability, a robot could be built whose benefits far outweighed any risk. Bill proved the naysayers wrong and built the world's most advanced† (WAM®) robotic arm.

Bill founded Barrett in 1988 and licensed his technology to MAKO Surgical (now a division of Stryker Medical) for use in their haptically-guided surgical robots. SensAble Technologies also licensed Bill's technology to develop the first desktop haptic device, called the PhanTom.



The original Puck®

Frustrated by the shortcomings of commercially available motor controllers, which were large, heavy, and required dozens of unreliable electrical connections, Bill led the development of the Puck® and released it as part of the WAM® arm in 2004.

Now, after more than two decades of further development and refinement, Barrett is excited to offer this innovation to the world in the form of the 2 gram, 400 W P4-16™ and the 16 gram, 4 kW P4-37™.

The P4-37™ today

† Guinness World Records, Millenium Edition, pp170-171

P4-37™
4kW @ 37mm

Pucks shown actual size

P4-16™
400W @ 16mm

Features

- 16mm P4-16™ for your smallest applications
- 37mm P4-37™ for your high power needs
- High Speed CANopen communication
- 5 wire bus: 2x CAN, motor rail, logic rail, ground
- Up to 31 controllers per bus
- Built-in absolute rotary magnetic encoder
- 5V and 3.3V auxiliary outputs
- Patented low-noise dual current sensors
- Space-vector commutation
- 32-bit floating point processor
- Low torque ripple
- I^2T dynamic power limiting
- Quiet, fan-less operation
- Internal temperature sensor
- In-system field-upgradeable firmware
- Adjustable PWM frequency (up to 100KHz)
- Dual 16-bit analog inputs
- Up to 6 digital I/O
- Supports external encoders (SPI & Quadrature)
- SPI Master peripheral support
- In-field calibration and tuning support

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the Puck®

SERVO MOTOR CONTROLLER

CREATED BY Barrett™ DRIVE SYSTEMS

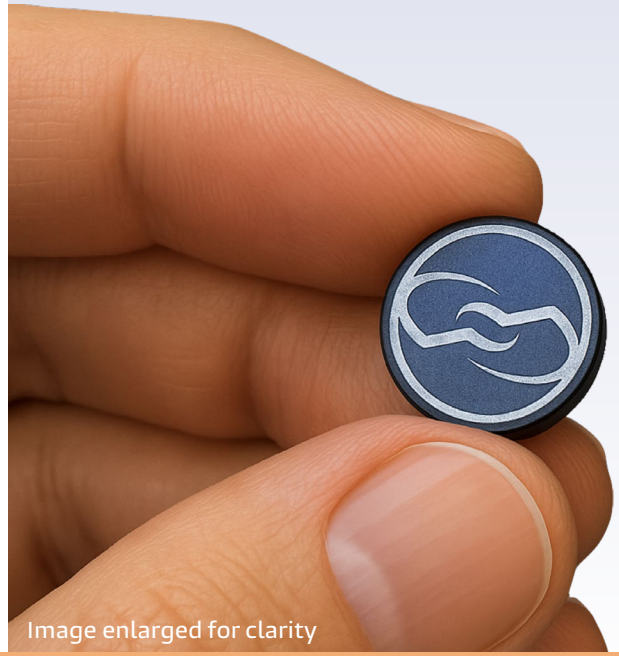


Image enlarged for clarity

Questions?
Contact our sales team!
sales@barrett.com

Purchase your Puck® or Development Kit now!
https://barrett.com/store

This is the Puck®

The Puck® will change the way you design products

Puck® motor controllers combine power and elegance with compact design and sophisticated motor control. Their daisy-chain (and/or star) topology reduces wiring and enables a network of up to 31 Pucks per bus. With the onboard encoder, the Puck® eliminates signal degradation, power loss, and cable bulk inherent to traditional motor control systems.

At just 6mm tall and 2 grams, the Puck® P4-16™ fits snugly against the back of any motor. Just snap it in place and let decades of Barrett engineering handle the rest. With such a small package, one might expect heat to be a challenge, however the Puck's built-in heatsink and an operating range of -25°C to 100 °C allow the P4-16™ to offer up to 400 W of silent, fan-less performance without compromising speed or payload.

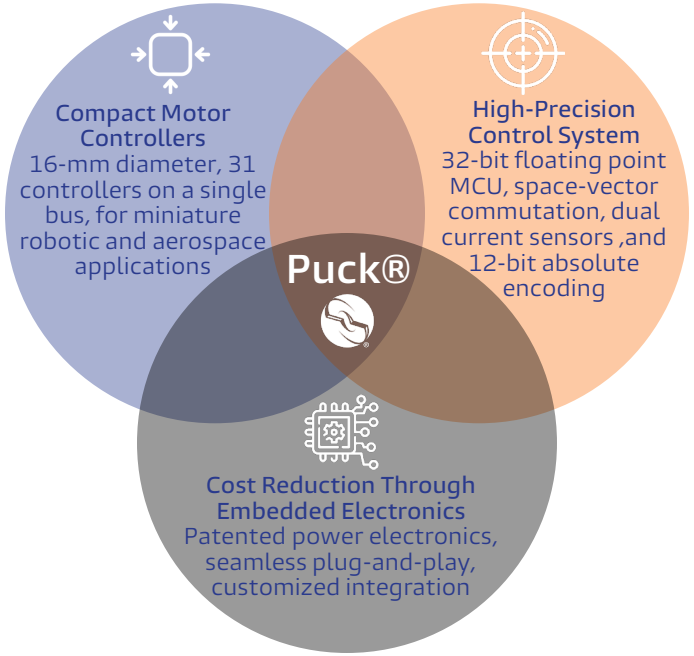
For high-power applications, the 11.5mm tall P4-37™ can't be beat. Supporting 4 kW power (at up to 160-V nominal motor voltage) the P4-37™ supports high speeds and large payloads, such as Barrett's dominant Ultra-High-Speed (UHS™) WAM® arm.

Contact Barrett's experts to see if the Puck® is a good solution for your OEM application:

sales@barrett.com

The Sweet Spot

What sets the Puck® Apart



Competitive Comparison

	Puck P4-16	Everest	Gold Twitter
Volume	1.2 cm^3	12.7 cm^3	13.4 cm^3
Mass	2.0 g	24.0 g	39.6 g
Encoder	12-bit	None	None
Power Density	200 W/g	120 W/g	50 W/g
Idle Power	0.4 W	2.2 W	2.5 W
Location	USA	Spain	Israel

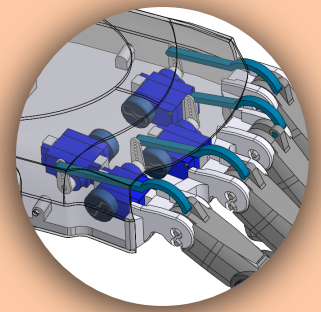
Where does the Puck® shine?

Aerospace

The Puck® is designed for aerospace applications, where every gram matters. Its lightweight design extends flight time, while its precision control ensures smooth, stable motion. With low power consumption and minimal wiring, the Puck® helps engineers create more efficient, responsive, and longer-lasting aerial systems.

Robotics

The Puck® makes medical and humanoid robotics lighter, more efficient, and easier to integrate, enhancing motion control, battery life, and durability to accelerate innovation in automation and surgical devices. The small size of the Puck® also allows for integration into confined spaces, such as robotic hands, without compromising precision or control.



Barrett™
DRIVE SYSTEMS

Div Barrett Technology, LLC
320 Nevada Street
Ground Floor, Building Rear
Newton, MA 02460-1435, USA

https://barrett.com/puck
+1 (617) 252-9000