



Actuator Package v1.0

Features

- Fully integrated brushless motor (BLDC), power electronics and control logic
- Plug and play solution: no programming needed for most applications
- Cross-platform graphical user interface and full suite of C/C++, Python and MATLAB demo scripts
- Built-in high-performance controllers: current, position, impedance, and voltage.
- Built-in sensors and interfaces: 6-axis IMU, voltage, current, temperature, strain gauge amplifier, etc.
- Communication: Bluetooth Classic EDR, USB, RS-485, SPI, UART and I2C
- Safety features: battery I²t, motor I²t, voltage limits, temperature

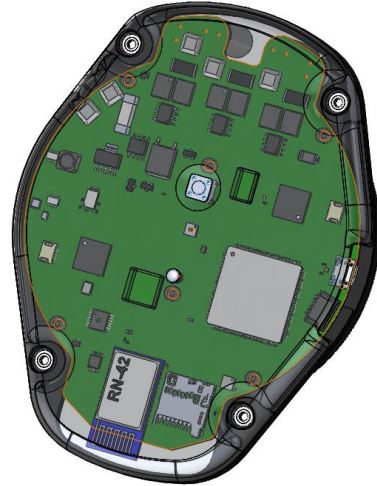


Table 1. Motor

Mass	230 g
Terminal resistance	186 mΩ
Terminal Inductance	138 μH
Torque Constant	95 mNm/A
Diameter	87 mm
Length	17 mm
Rotor inertia	1E-4 kg m ²

Table 2. Housing

Mass	50 g
Material	7075-T6 Aluminum
Finish	Black anodization

Can be customized and/or engraved. Ask during the quoting process.

Table 3. Embedded System

Mass	41 g
Voltage	20-50 V (5s-12s LiPo)
Commutation type	4-quadrant Field-Oriented control (4Q FOC)
PWM frequency	20 kHz
Max continuous current	10 A (Note 1)
Peak current	30 A (Note 1)
High level controller	STM32F427 180 MHz Cortex-M4 with floating-point unit (FPU)
IMU	MPU-9250 6-axis (3-axis accelerometer, 3-axis gyroscope) (Note 2)
Bluetooth	RN-42 Class 2 EDR Bluetooth module
Strain-gauge amplifier	One full-bridge channel, 5V excitation Gain = 203
Motor encoder	Absolute magnetic encoder, 14-bits
Current sensing and control	Motor: 3-ch 12-bits sensing, 10kHz PI controller Battery: ±20A, 900Hz bandwidth, 12-bits
Safety protections (HW)	52V TVS, 10A slow-blow fuse
Intrinsic sensors	Battery voltage, intermediate voltage, +5V bus, temperature, etc.

(1) Higher currents can be used with a heatsink.

(2) Magnetometer disabled by software - overpowered by the motor's magnetic field

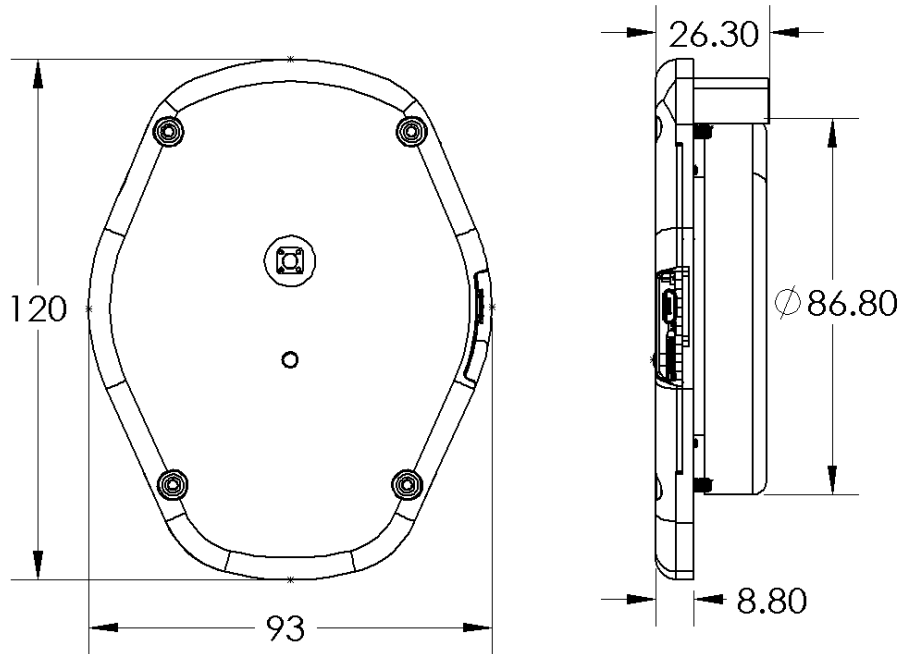


Figure 1. Physical dimensions

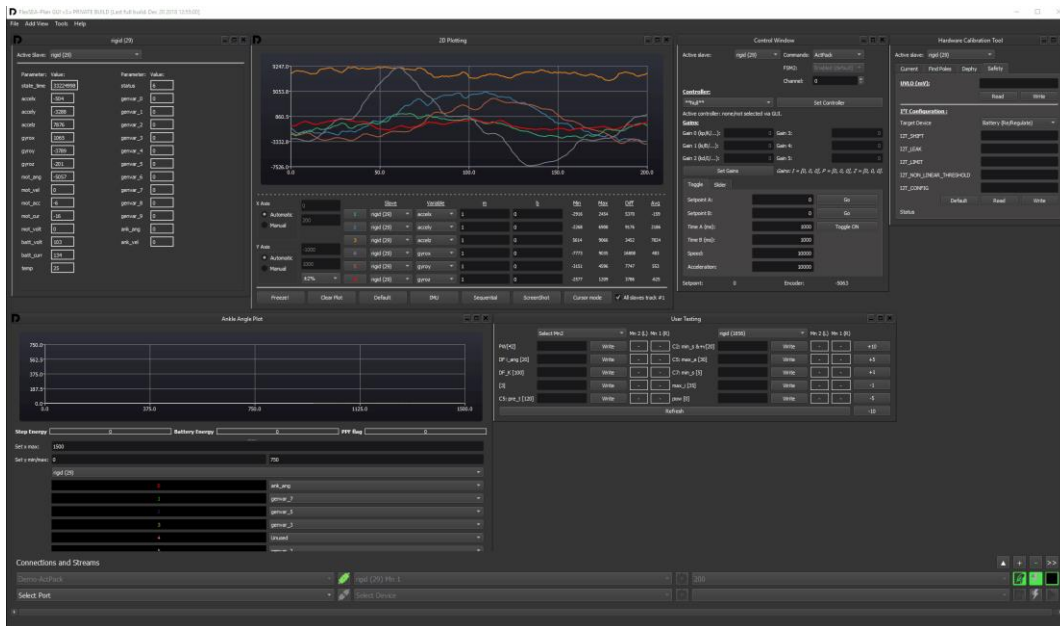


Figure 2. Control panel: display (and datalog) sensor values, tweak controllers, etc.

Resources:

- Scripts: <http://dephy.com/wiki/flexsea/doku.php?id=scripts>
- 3D files (STEP): <https://goo.gl/82irvp> (26MB)
- Questions? Email technical@dephy.com