Application

The Evolution Controls Bluetooth® Control Unit, ECM-BCU, provides a means to wirelessly adjust the output of an EC Motor. The EC motors are fractional horsepower fan motors featuring an internal microprocessor to provide exceptional efficiency, performance and motor life. The ECM-BCU allows adjustment of the airflow index[1] from 0 to 100% between the manufacturer's programmed minimum and maximum airflow to maintain a constant airflow.

A green LED provides the power and the control output status by continuously flashing out the flow control output percentage.

The mobile app, EVO Devices, running on Android mobile phones or tablets, connects with the ECM-BCU control unit to configure and monitor the motor through the Bluetooth wireless connection.

Features

- Bluetooth® wireless technology for easy access at hard to reach locations

- Adjustable and Scannable RPM alarm

- Access Protection

- PWM[2] or 0 to 10 V Output

- Pilot Pulse Enable/Disable

- Secured Wireless Feature Update

Ordering

EVO/™ECM-BCU   Control without plate
EVO/™ECM-BCU-MP   Control with plate

Accessories

EVO/™ECM-CBL-??   EC Motor control cable.
EVO/™USM-CBL-??   US Motor control cable
EVO/™ECM-PBL-??   Power Cable.
                    ?? = Length in ft.
EVO/™ECM-SBL   3' serial communication cable for configuration

EVO/™ECM-BCU

Specifications

Power   ~24V ±20% 50/60 Hz NEC Class2 USA
               +24V NEC Class 2 USA
               2 W, 4 VA + 1VA/Motor

Outputs
- Go   +15V @ 10 mA
- Motor Control (See Motor Settings section)
          PWM   +15V @ 10 mA
          0 to +10 VDC @ 10 mA
    PWM Supports Pilot Pulse (Autoswitch) Function

Input
- Motor RPM   0-2000 RPM ± 1RPM
                   36 ppt or 18 ppt

Adjustable and scannable out-of-window RPM alarm
(See Motor Settings in EVODevices Mobile App section)

Therm.   < 0.01%/°F
Stability

Operating   0°F to 130 °F (-18°C to 55°C)
Environment   10-80% rh

Wired   Serial port with proprietary
Communication   command set

Radio
   Receive Sensitivity -92 dBm sensitivity
   Output Power   +3 dBm
   Range   50 m (150ft)
   (*Actual range may vary depending on the mounted location*)

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[1] Flow index = %PWM except at the end points when the pilot pulse is enabled.   [2] Pulse Width Modulation (PWM) = Vspd

Mobile Device Requirements

Platforms   Android phones or tablets

Operating System   Android Ver 7.0 or higher

Bluetooth   Ver 4.2 or higher

Operation

ECM-BCU

A 4-wire control cable connects each ECM-BCU to an EC motor. The motor control output signal can be 0-10V or 0 to 100% PWM. All controls are shipped with the same device name, ECM-BCU. In applications with more than one controller, each ECM-BCU must be renamed with an unique device name.

When powered up, the green LED stays on for three seconds, then continuously indicates the flow index. After a pause, the lamp flashes out the tens digit, then the units digit of a number between 0 to 100%. Long flashes represent the tens digit, and short flashes represent the units digit. For example, a flow index of 23 flashes two longs, then three shorts. A steady heartbeat of flashes indicates a flow index of 0. An extra-long flash and ten short flashes indicates a flow index of 100.

The LED turns solid green when the ECM-BCU is connected to the EVO Devices mobile app.

For data security, the ECM-BCU only pairs with the EVO Devices mobile app providing three levels of access protection.

- Read only – These are data that allow read only without authentication
- User Password Authentication – This level allows the user to read and write motor settings.
- Admin Password Authentication – This level allows the user to read and write all data.

User and admin passwords are disabled by default from the factory. They can be enabled according to the need of the application.

The RPM from the motor is continuous monitored and an alarm is set when the RPM is outside the normal thresholds. See Motor Settings for RPM Alarm threshold settings.

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Wired Communication

The Evolution Control's BT Configurator Windows® software can be used to speed up the commissioning process; for example, re-naming the ECM-BCUs before installation. A ECM-SBL cable is used to connect between a PC's USB port and the controller's serial port.

EVO Devices Mobile App

EVO Devices runs on Android phone or tablet mobile devices. It can be downloaded from Evolution Controls website, gotoevo.com. See the end of this datasheet for the apk installation guide.

Phone Platform

When the app is running on the phone, the first screen contains the **SCAN** and **CONNECT** buttons. The **CONNECT** button is initially disabled.
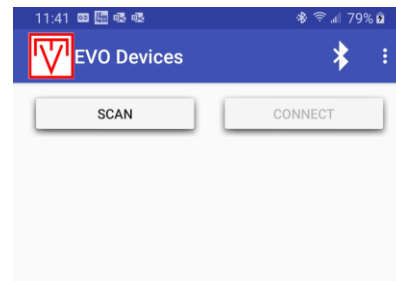

Press the **SCAN** button to discover all ECM-BCU units operating within the mobile device's signal range. The app will continue to scan for 60 seconds or until the stop button is pressed in the progress dialog.
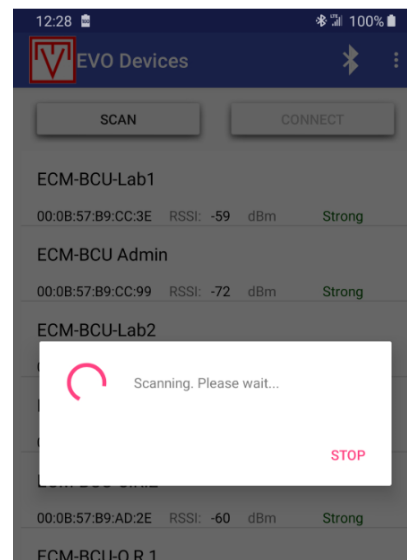
Along with the device name, each device shows the six-byte MAC address, the receive signal strength, RSSI, in dBm and a Strong/Good/Weak signal strength. Tap to select a device. The selected device will be highlighted as shown below in the **List** View for connection.
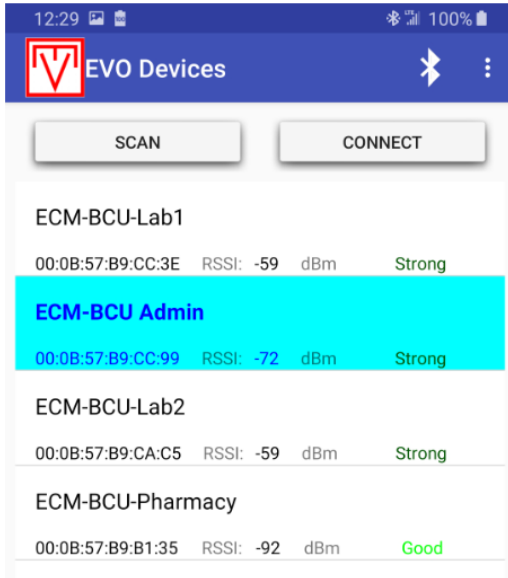
Devices in RPM alarm are in red. In the sample screen shot below, ECM-BCU-Pharmacy is shown in RPM alarm. RPM alarm thresholds can be configured in the motor settings view of each device, See **Motor Settings** section.
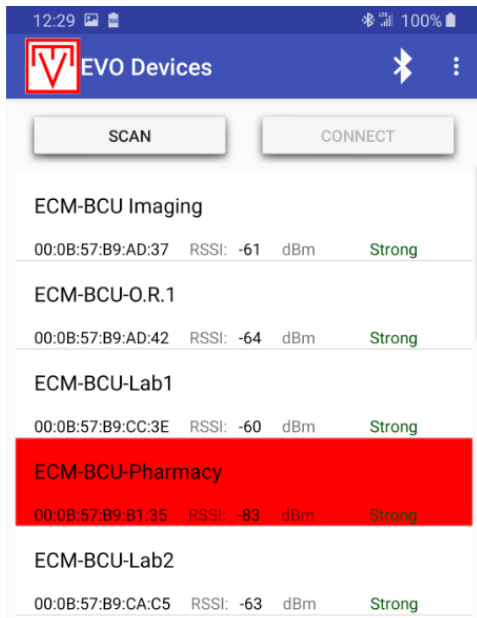
Selecting a device in the **List** view enables the **CONNECT** button. Press the **CONNECT** button to start connection and pairing to the select device. The display will switch to the **Motor Control** view.
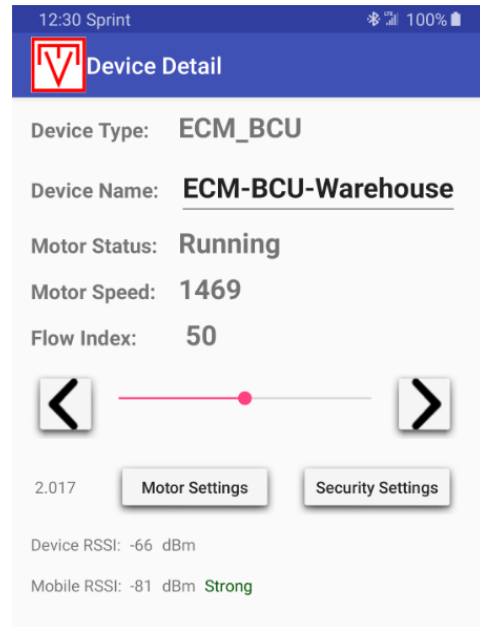
Device Type – The type of Evolution Controls Bluetooth device. Read only.

Device Name – A unique name for the device. It is an editable text box. The maximum length is 20 characters. It is protected by the Admin password if the password is enabled. Tap the device name edit box to bring up the virtual keyboard. When finished, press the **Done** key to send new name to device.

Motor Status - Running or Stop. Read only.

Motor Speed – the RPM display from the motor tachometer feedback. Read only.

Flow Index – motor flow index display between 0 to 100%. Read only. The factory default flow index is 50%.

Flow Index slider and ❮ ❯ buttons - flow Index adjustment controls. Tap or drag the slider for large adjustment and arrow buttons for fine adjustment. The user will need to have either user or admin privilege to change the flow index if the passwords are enabled.

"2.017" – device version. Read only. The first digit is the version. The digits after the decimal point are the

revision number. The numbers in the example show Version 2, Revision 17.

Motor Settings button– Press to open the motor settings view. The user must have user or admin privilege to access the motor settings if the passwords are enabled.

Security Settings button – Press to open the security settings view. The user must have admin privilege to access the Security Settings if the passwords are enabled.

Device RSSI – Device receive signal strength

Mobile RSSI – Mobile device received signal strength

**Signal Strength** – Display strong, good or weak according to the received signal strength

Press the back button, ⟵ or ◁, located on the device to disconnect and return to the **List** view.

Security Settings

Press the **Security Settings** button to access the security settings. The user must have the Admin password to access the security settings. The Admin password authentication dialog will pop up for user to enter the password.
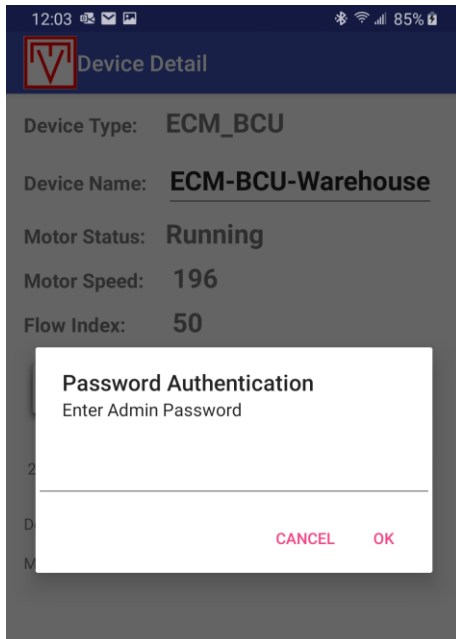
Enter the Admin password and press OK to authenticate. The screen will switch to the **Security Settings** view after the password has been authenticated by the controller.
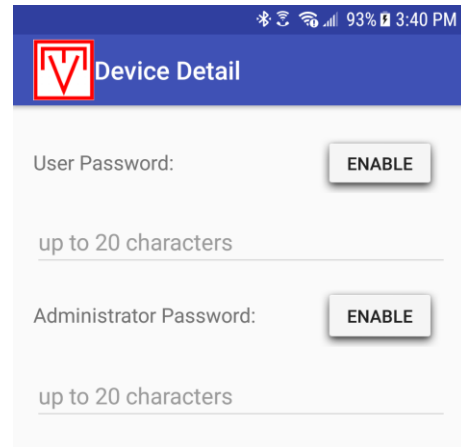
Press the button to enable or disable the respective password. All passwords are disabled from the factory as shown in the sample view above. The app automatically applies the rules below when enabling passwords.

- When the User password is enabled, the Admin password is automatically enabled.

- When the Admin password is disabled, the User password is automatically disabled.

User and **Administrator Password** edit boxes are disabled until the corresponding password is enabled. When enabled, tap the password edit box to bring up the virtual keyboard. When finished, press the **Done** key to send the password to the controller. The default User and password is *password* and the default Admin password is *admin*. The Passwords are case sensitive.

Press the back button, ⟵ or ◁, located on the device to return to the **Motor Control** view.

Motor Settings

Open the **Motor Settings** view by pressing the **Motor Settings** button. Use either the **User** or **Admin** password to access the motor settings. When enabled, the password authentication dialog will pop up. Enter either the correct User or Admin password to access the **Motor Settings** view.
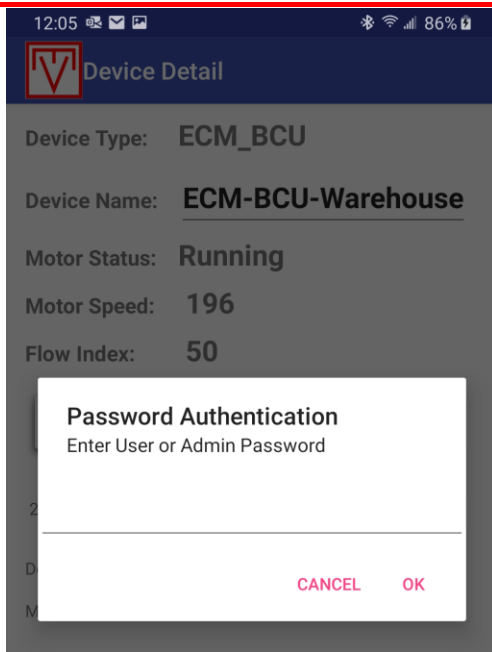
After the User or Admin password has been authenticated, the screen will switch to the **Motor Settings** view.

RPM Type – 36 or 18 Pulses Per Turn (PPT). For example, select **18 PPT** for Symax-i56 motor and select **36 PPT** for EON, ECM 2.3 or higher, PerfectSpeed motor. Check motor provider for the RPM type to use. The factory default is **36 PPT**.

**Output Type –** Select between PWM or 0 to +10V motor control. The factory default is **PWM**.

Pilot Pulse - PWM operates between 0.4% and 99.6%. Enable pilot pulse when the motor profile allows the motor to run in an alternate mode when there is no pulse on the PWM input. The factory default is **Disable**.

RPM Alarm – This is an out-of-window alarm. The alarm status is reported in the **SCAN** List. The normal window is between the **Alarm High** and **Alarm Low** thresholds. The device is in alarm when the motor RPM is above the **Alarm High** or below the **Alarm Low** thresholds. The alarm is cancelled automatically when the RPM returns to within the thresholds.

The factory default of the **RPM Alarm** is **Disable**. Enabling the **RPM Alarm** will enable the **Alarm High** and **Alarm Low** edit boxes.

Alarm High – The RPM alarm high threshold. The default is 2000. The device is in RPM alarm when the motor RPM is above this threshold. It is disabled by default. Tap the **Alarm High** edit box to bring up the virtual numeric keypad. When finished, press the **Done** key to send the new value to the controller.

Alarm Low – The RPM alarm low threshold. The default is 0. The device is in RPM alarm when the motor RPM is below this threshold. It is disabled by default. Tap the **Alarm Low** edit box to bring up the virtual numeric keypad. When finished, After finished, press the **Done** key to send a new value to the controller.

Press the back button, ↩ or ◁, located on the device to return to the **Motor Control** view.

Tablet Platform

The EVO Devices runs on a tablet platform in a dual pane layout with the **List** view always on the left and the **Motor Control** and its child views on the right.
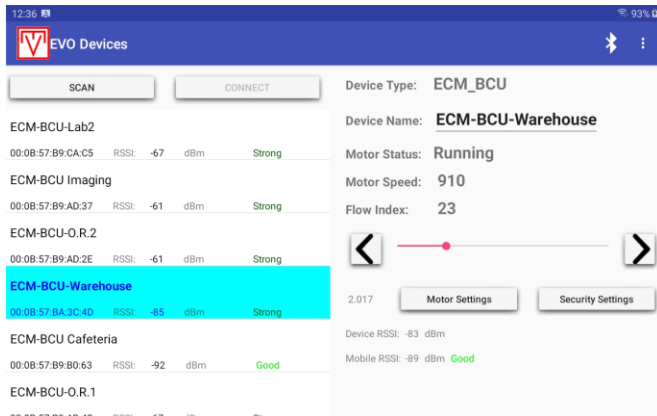

The app runs the same way as in the phone. The **CONNECT** button is disabled after the app has connected to a device. When the user selects a different device from the device list, the app will disconnect from the current device, clear the right pane and re-enable the **CONNECT** button to get ready to connect to the new selected device.
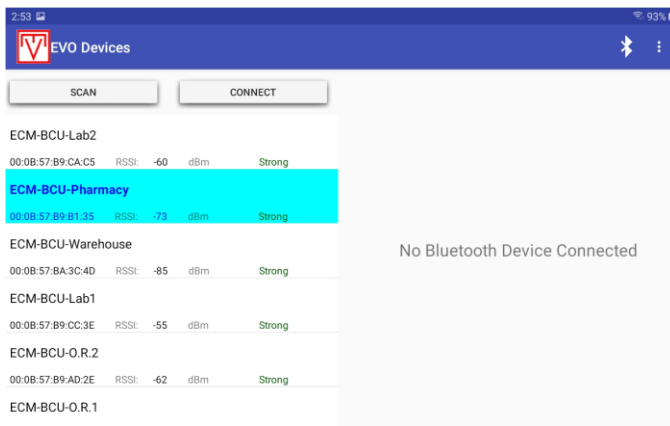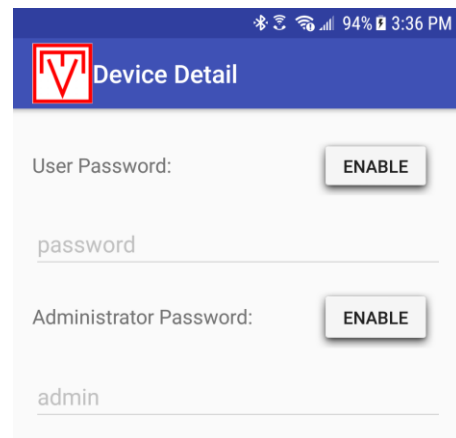

Password Recovery

Password recovery allows the user to recover the passwords. It is activated when the controller detects the state of the two pins, highlighted below, changes from open to close.
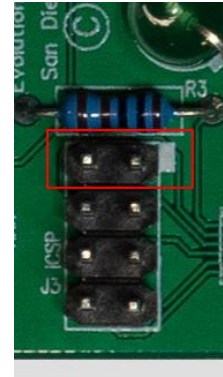
Inserting a jumper to activate the password recovery. If a jumper is already inserted, first pull it out to open the pins, then re-insert to close. After the jumper is detected, the green LED flashes rapidly for 5 sec. before the password recovery is activated. If the jumper is removed within the 5 sec., the password recovery is cancelled. When the 5 sec is done, the green LED will then return to normal operation, flashing out the flow index output. The passwords are disabled so the user can access the **Security Settings** to read the passwords.

Passwords are encrypted in the recovery process and stay encrypted in the app.

Reminder: re-enable the passwords after you are done reading the passwords.

Motor Profiles

Motor profiles are unique to each manufacturer and motor. Refer to the motor manufacturers instructions to develop the motor profile. The following are a few considerations important to operation with the ECM10-BTH1:

- ☑ PWM or 0 -10V control

- ☑ Status to RPM only

- ☑ Motor start/stop points if motor does not use the GO signal from the ECM-BCU for the on/off control.

Mounting

Mount the controller with clearance for the power wires and control cable connector. The mounting post must be fastened to an earthed metal surface. The transformer may be located near the motor or near the control.

When mounted inside an enclosure, the ECM-BCU must not be entirely enclosed. The faceplate must be visible from the outside. In general, the signal is strongest in the direction which the faceplate is facing.

The label "Contains FCC ID:DOQBGM113" must be in a visible area.
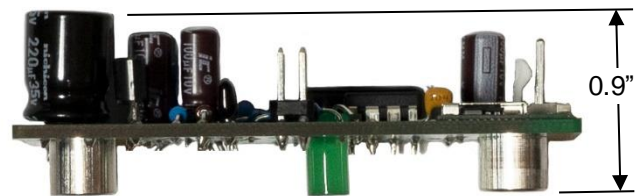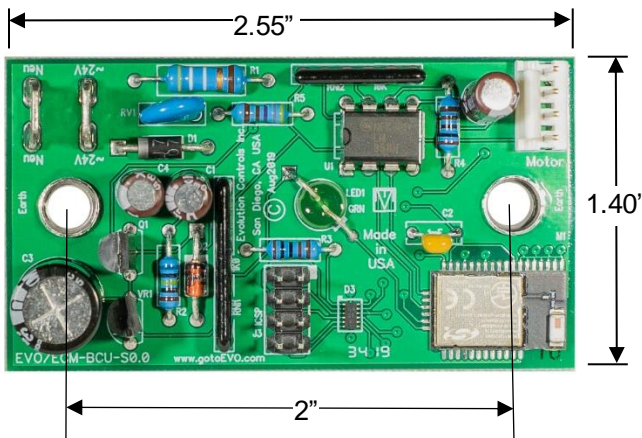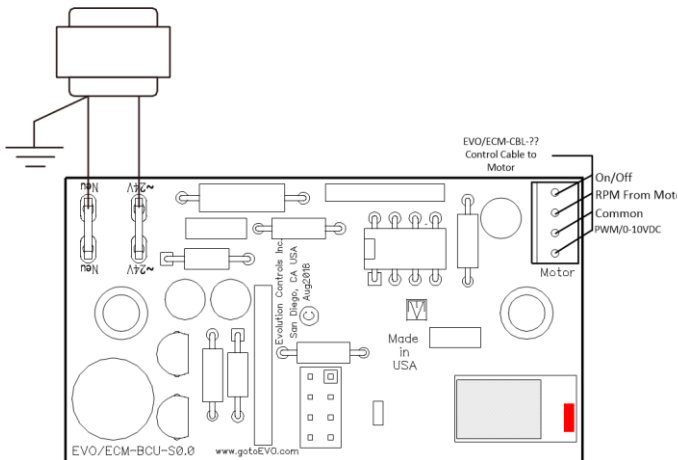

Mounting Plate Dimensions
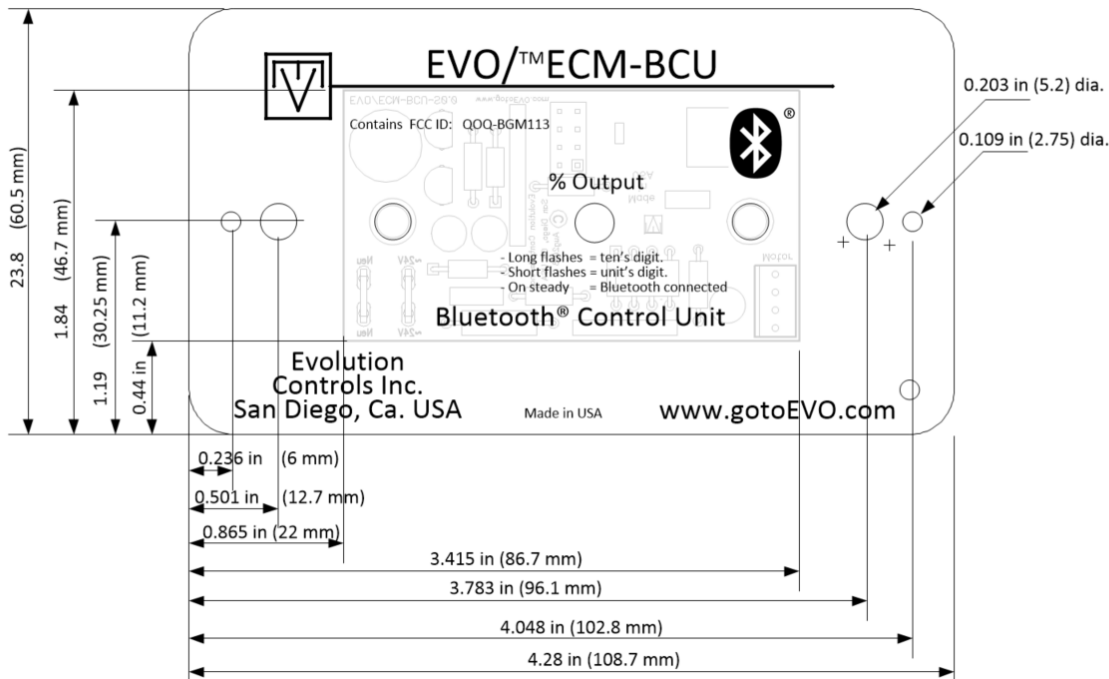
Wiring

Power the EVO/™ECM-BCU controller with a ~24V NEC UL 1310 Class 2 USA power source. DC voltages from +20V to +30V may also be used to power the control. Observe all code requirements and follow all safety practices regarding low voltage power supplies and circuits to insure a safe, reliable installation.

Earth one side of the power source. Connect the neutral connection to the earthed side of the ~24V Class 2 power source. Earth the negative when DC power supplied is used.

Some applications may require an isolated power supply or alternative earthing scheme. Follow code requirements and observe all safety practices concerning unearthed low voltage circuits.

Connect the ~24V or +24V connection to the hot side of the Class 2 power source. You may interrupt this connection to turn off the controller and stop the EC Motor. Many automation controllers will power the ECM-BCU controller directly from an on/off output.

One end of the control cable is fitted with a 4-pin connector. Fit this connector into the mating socket on the edge of the EVO/ECM-BCU controller. Plug the connector in with the cable exiting away from the board.

Factory Defaults

| Flow Index	50%
User Password	password
Admin Password	admin
RPM Type	36PPT
Output Type	PWM
Pilot Pulse	Disable
RPM Alarm	Disable
RPM Alarm High	2000 RPM
RPM Alarm Low	0 RPM

EVO Devices Installation Guide

The app is available from Google Play Store. Launch Google Play Store in your Android mobile device. Enter EVO Devices in the search bar.
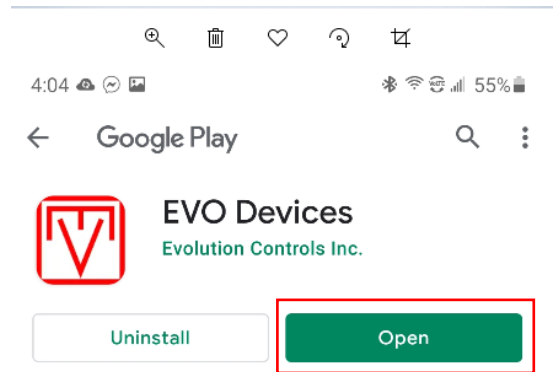
Tap the EVO Devices by Evolution Controls Inc.
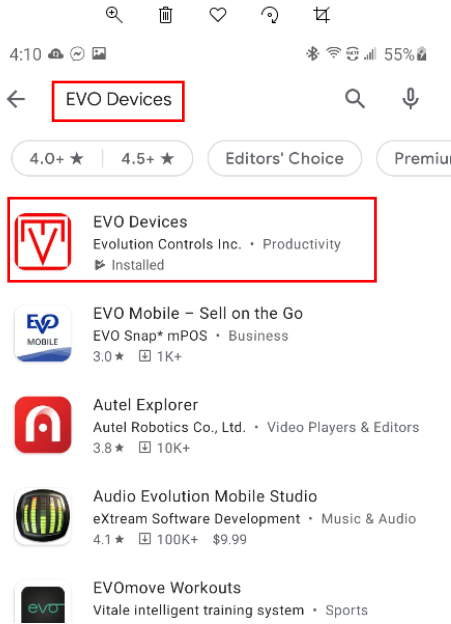
Tap the Install bar to install the app in your mobile device.
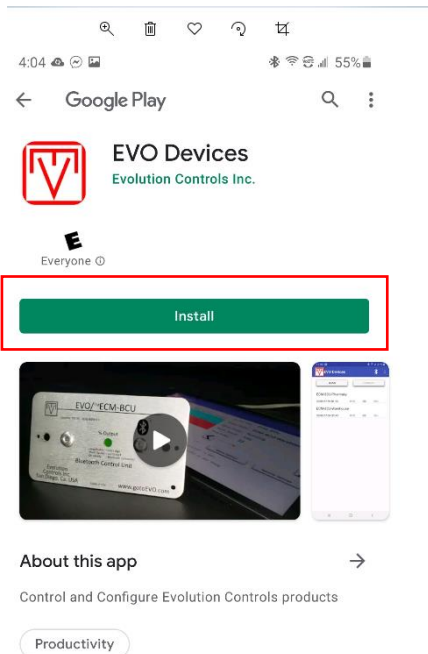
When the installation is complete, tap Open to launch the app.

Allow EVO Devices to access this device's location while using the app.