Please follow the instructions for proper installation, wiring, and programming of the KDE Direct UAS Electronic Speed Controller (ESC) series to the Pixhawk Mini and PX4 open-hardware project autopilot.

PIXHAWK (PX4) EQUIPMENT

The Pixhawk (PX4) autopilot is powered via the power module (PMU) included with the system for multi-platform autonomous vehicles. For additional information on the correct installation of the autopilot equipment, please reference the **Pixhawk Autopilot Website**.

Due to the hardware design of the Pixhawk (PX4) autopilot, power is NOT provided to the ESCs via the MAIN OUT control-lead signal ports.

The KDE Direct UAS ESCs are OPTO-Isolated and therefore, require a 5V or 6V external power-line to properly arm the internal circuitry critical for safe flight operation. As a reference, the UAS ESC OPTO-Isolation circuitry is compatible up to 35V maximum-input.

KDE DIRECT UAS ESC OPTO-ISOLATION CIRCUITRY

To provide clean, voltage-regulated power for the KDE Direct UAS ESCs, the **KDEXF-UBEC22** is available for direct compatibility to the electronics. During assembly, set the voltage-selection jumper to 6V as shown – please review the Instruction Manual (included with purchase and found under the webpage Technical Media tab) for additional details on proper installation and wiring of the device.
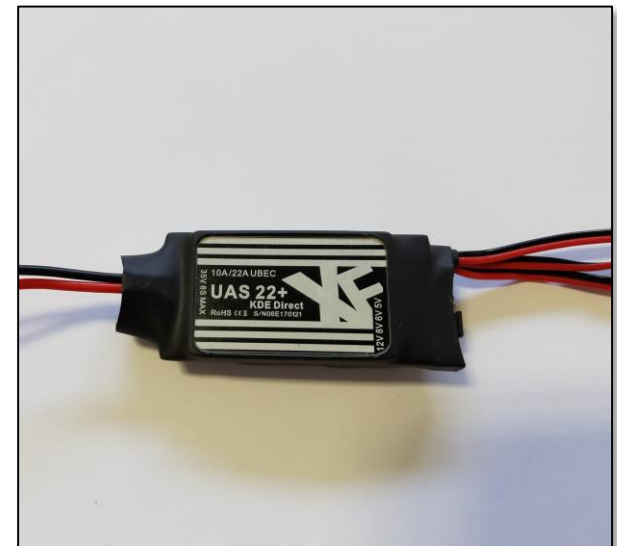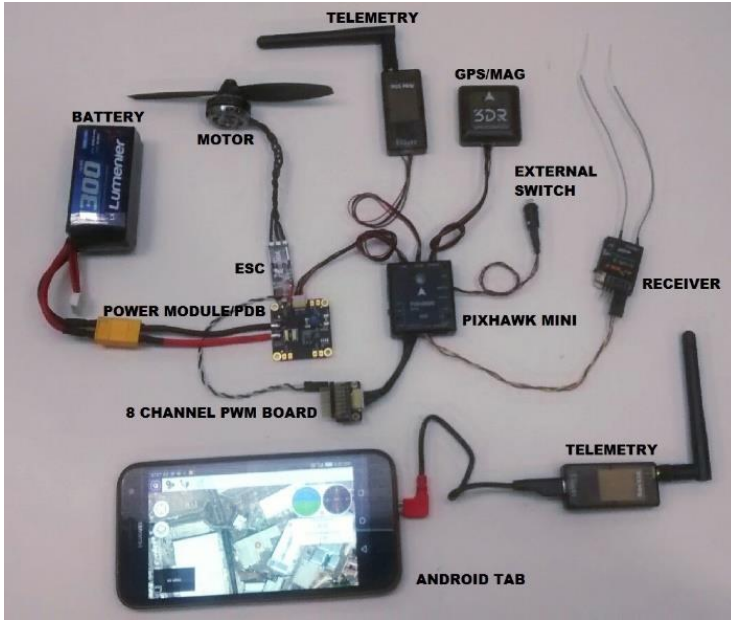
ESC HARDWARE INSTALLATION AND WIRING

For proper installation, connect each ESC to the 8 Channel PWM board.

At a minimum, one (1) power-output lead is required to provide the necessary 5V or 6V power for proper operation of the KDE Direct UAS ESCs.

For Octocopter setups, simply connect one of the KDE UBEC leads via a Y PWM cable to provide power to the MAIN OUT pins.

PIXHAWK 2.1 (CUBE) CONNECTION OUTPUTS AND PORTS

For Quadcopter systems, please reference the picture shown to the right:

- UAS ESC control-leads connected into ports "1 – 4"
- UAS UBEC power-leads connected into ports "5 – 7"
 - *(triple-redundant layout)*
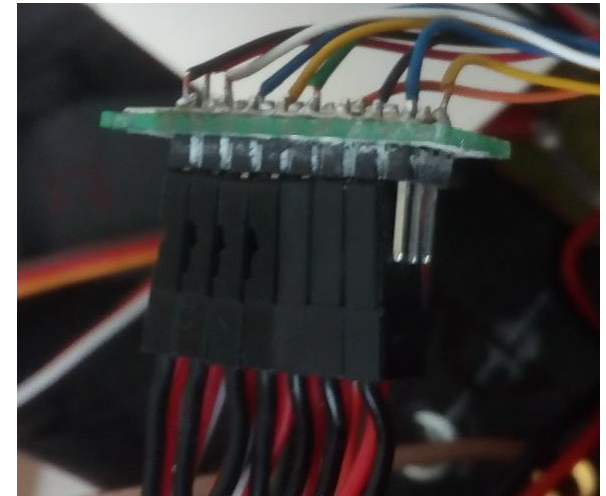
The KDE Direct UAS Electronic Speed Controller (ESC) series is programmable via the **KDEXF-DMA Programming Kit** (available separately) or direct via PC-USB connection (**UVC Series**), providing the ability for updates to the latest firmware releases and customize advanced options. Please review the Instruction Manual (found under the webpage Specifications tab) for detailed information on Advanced Settings.
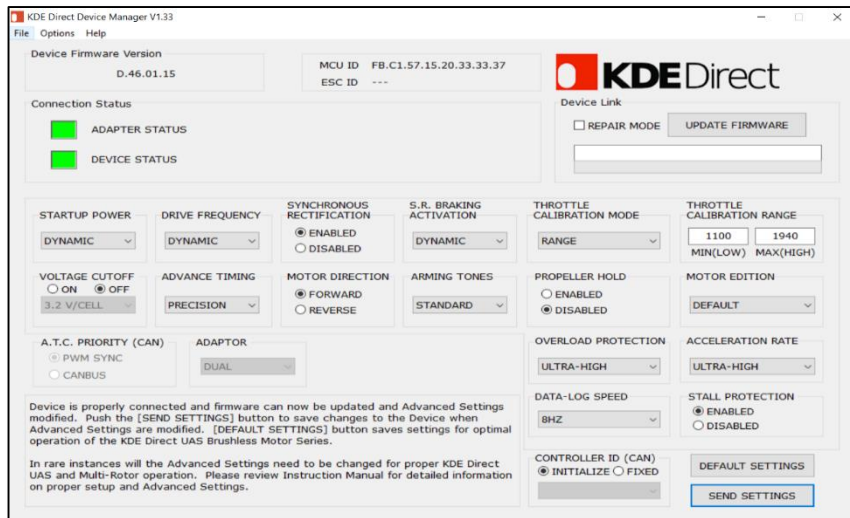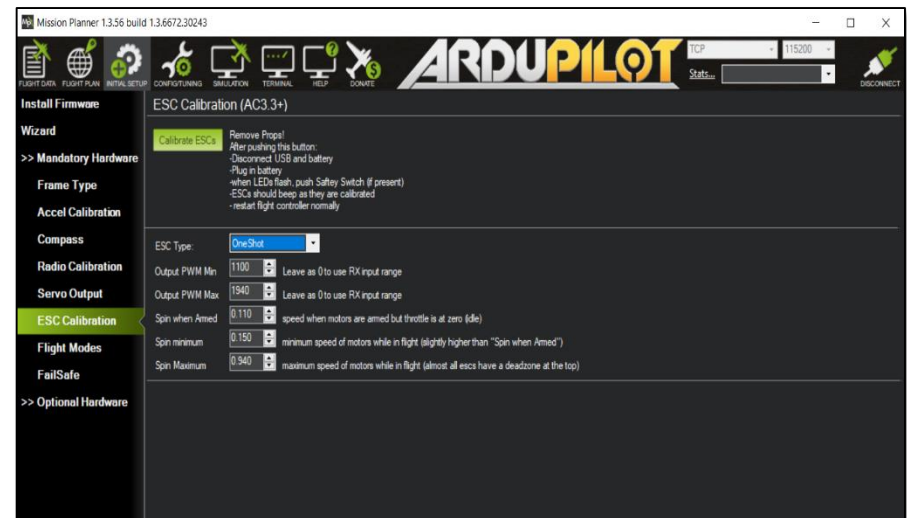

KDE DIRECT DEVICE MANAGER SOFTWARE

For direct compatibility to the Pixhawk (PX4) autopilot, change the "THROTTLE CALIBRATION MODE" to RANGE via the selectable pull-down menu. This will allow for a fixed throttle calibration to the autopilot, for simple programming via the ArduPilot Mission Planner software and Radio/ESC Calibration wizard.

Within the "THROTTLE CALIBRATION RANGE" option, use the default settings of MIN(LOW) = 1100 and MAX(HIGH) = 1940.

ARDUPILOT MISSION PLANNER SOFTWARE

After programming all KDE Direct UAS ESCs to the RANGE mode as described above, setup of the Pixhawk (PX4) via the Mission Planner software can proceed. The manual throttle calibration process is not needed via the RANGE mode - simply hard-code the settings of Output PWM Min = 1100 and Output PWM Max = 1940 as shown.

For additional information on the correct programming and operation of the Mission Planner software, please reference the **Mission Planner Home Website**.

Note: program the "ESC Type" to "OneShot" for synchronization of autopilot gyros and ESC control frequencies (400 Hz dynamic).