

## Guides and Resources: Basic IO - QDrone

# Motors

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This document will summarize how to write commands to the QDrone's motors.

# Writing to Motors

**Note:** Ensure that your QDrone is powered ON (charged battery plugged in) and that a connection has been established to it. Follow the steps under [Charging Vehicle Batteries](#) and [Communicating with the QDrone](#) in the [Research Studio Setup Guide](#).

**Note:** Ensure that you have read and understood all the safety procedures and guidelines regarding charging Lithium Polymer batteries as well as guidelines on using the QDrone in a safe manner outlined in the [Research Studio Setup Guide](#). If you have any concerns or questions, please contact Quanser technical support (tech@quanser.com).

**Note:** Safety eye glasses should always be worn, even outside the net.

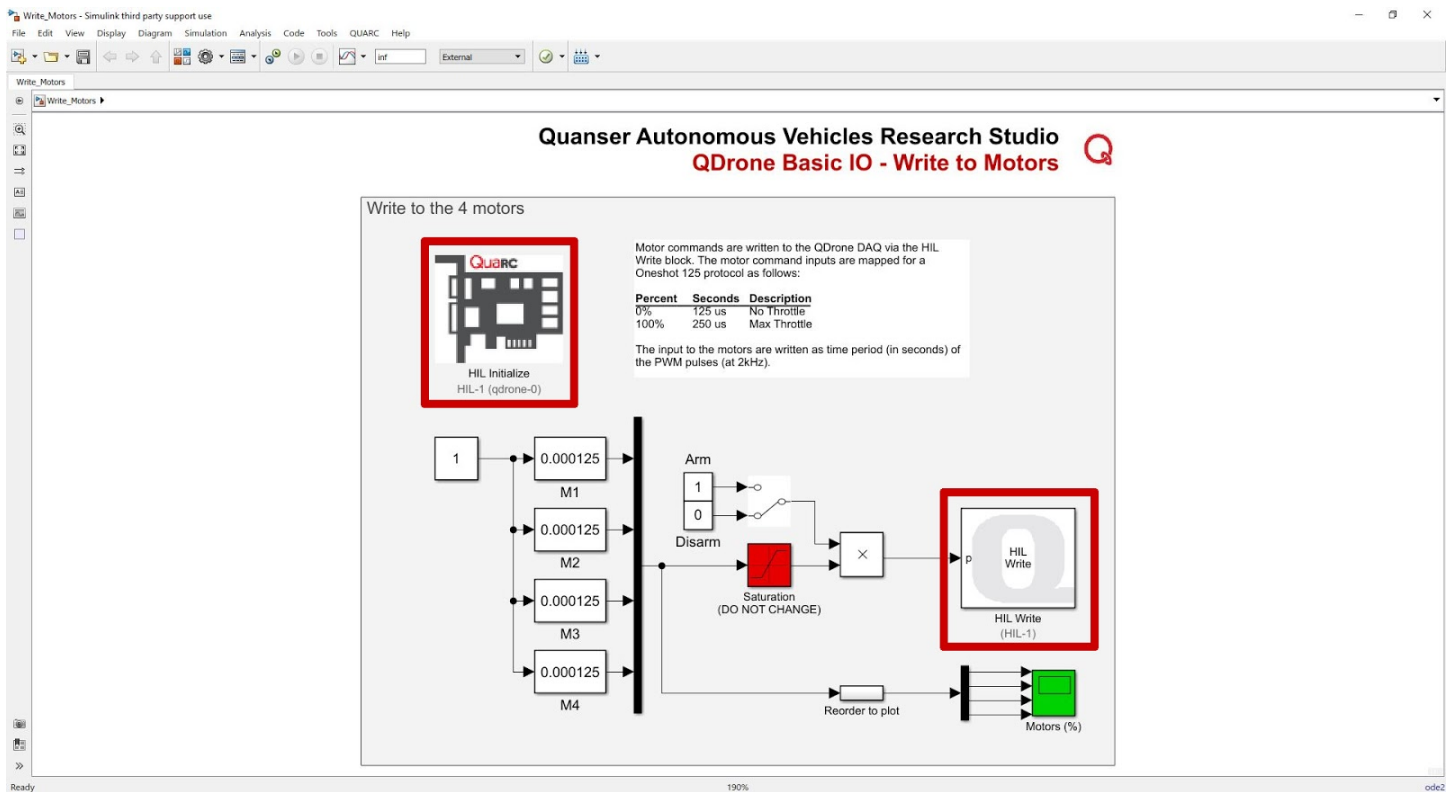


Figure 1: Write\_Motors.slx model, highlighting the HIL Initialize and HIL Write blocks

1. Under the [Guides and Resources > Basic IO > QDrone > Software](#) folder, open [Write\\_Motors.slx](#) (Figure 1)

**Note:** For the latest documentation and controllers, please visit [Autonomous Vehicles Research Studio Resources](#).

**Autonomous Vehicles Research Studio Resources** weblink:  
<https://www.quanser.com/products/autonomous-vehicles-research-studio/>

2. Under Model Configuration Settings, input the correct QDrone hostname.

**Note:** See the [QDrone IO Check](#) section in the [Research Studio Setup Guide](#) for more information.

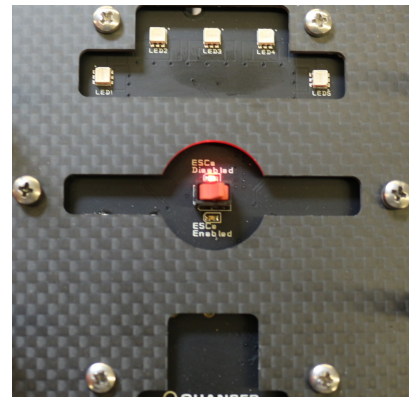
3. Ensure that the ESC disable switch is turned OFF (that is, the ESCs are enabled) indicated by an active **green** LED next to the switch (Figure 2a). Place the QDrone **inside** the workspace.



**Caution:** Do **NOT** turn on the QDrone/motors outside the workspace netting.



a. ESCs Enabled (motors allowed to spin)



b. ESCs Disabled (motors not allowed to spin)

Figure 2: ESC Disable switch and its two positions

4. Build the model (QUARC menu > Build).
5. Start the model (QUARC menu > Start).
6. The QDrone will emit 2 beeps signifying that the ESCs are enabled.
7. Move the Arm/Disarm manual switch in the model to the Arm position.
8. One by one, double click on the slider gains labelled M1 to M4 and slide them between 0.000125 s and 0.000250 s to change each motor's throttle between 0 and 100%. These values are written to the PWM channels in the HIL Write Block, where the channels are configured in the HIL Initialize block (Figure 1).



Figure 3 - Motor numbering on the QDrone



**Caution:** The Saturation block in the model limits the command PWM values written to the QDrone to a maximum of 0.0001375s (10% of max throttle) for safety reasons. These are direct motor commands without any stabilization controller. The drone's response cannot be predicted in such an open loop state.

**Note:** A **HIL Initialize** block must always be present and configured correctly for any IO to take place. The **HIL read/write** blocks allow you to read from and write to the channels configured in the **HIL Initialize** block. See [Guides and Resources > Concepts](#) for more information.

9. Disarm the QDrone by moving the Arm/Disarm manual switch to the Disarm position.
10. Stop the model.

This completes a tutorial on how to write commands to the Motors. This involves use of the Oneshot 125 protocol, which is covered in more detail under [Guides and Resources > Concepts](#).