

DRAKE Cluster Prototyping Guide

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What is a DRAKE Cluster?

The DRAKE Cluster is a method of combining multiple TacHammer DRAKE units to create a single haptic module referred to as cluster.

The DRAKE Clusters are typically used under two circumstances. The first is when a high g-force haptic output is required that typically exceeds the output from a single motor. The second is when a user wants a wider frequency response than is typically generated from a single motor.

In both instances, the user can combine and synchronously drive multiple DRAKE TacHammers to achieve their desired effect. Wiring guidance and DRAKE combinations are described in further detail in their associated sections.

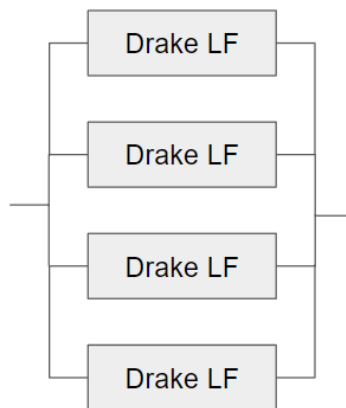


Additionally, the motors can be combined in ways that can accommodate irregular size requirements, such as large flat rectangular shapes, dense cubic shapes, or even longer cylindrical shapes. Further guidance can be found in the *Mechanical Considerations* section.

Wiring Guidance

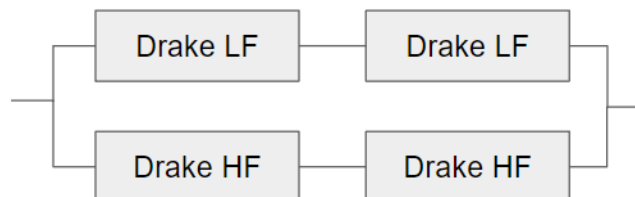
Generally, the output of a DRAKE Cluster will be dependent on the equivalent DCR of the circuit when composed of TacHammers in parallel and series combinations.

To maximize the output of a Cluster, all motors should be wired in parallel in order to the maximum amount of current to pass through each motor. In this system, the output will be proportional to the number of TacHammers in the cluster given that the power supply and motor drivers can provide sufficient power and voltage to the circuit.



Parallel Wiring Configuration

The motors can also be wired in series, however this approach is best suited for applications where users are seeking a broader frequency range rather than a maximized haptic output.



Series & Parallel Combination Wiring Configuration

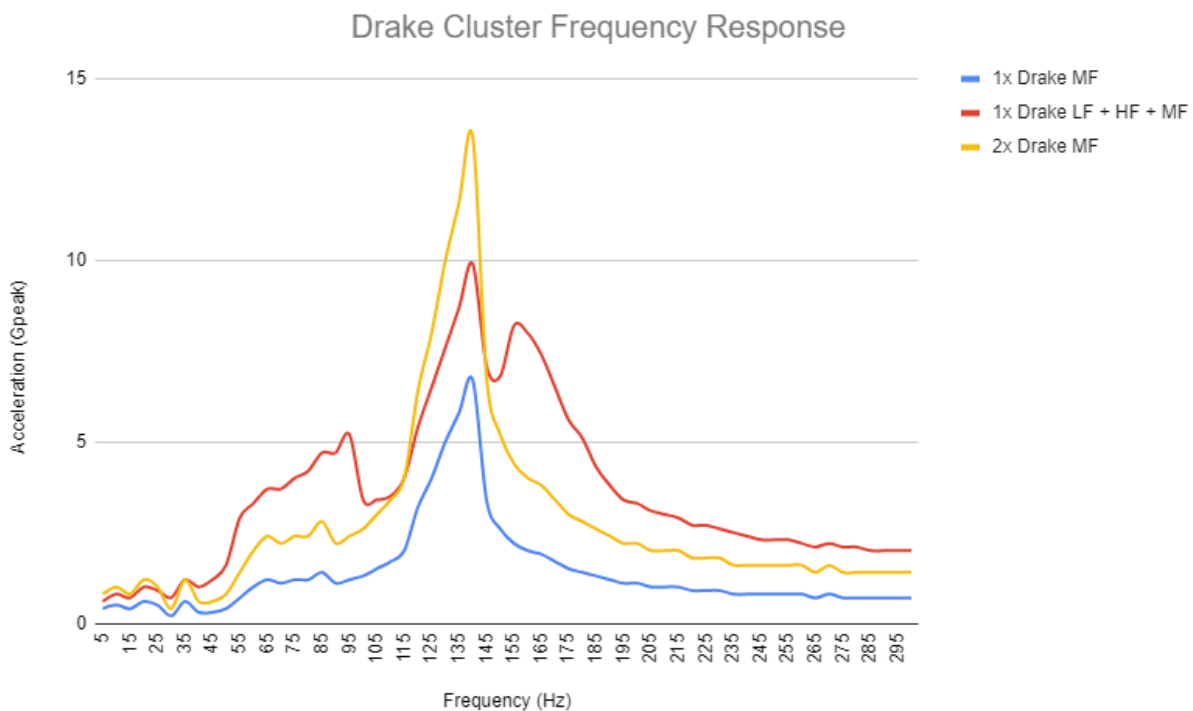
DRAKE SKU Combinations

In a DRAKE Cluster, multiple SKUs of DRAKE Low-Frequency (LFI), Low-Frequency (LF), Medium Frequency (MF), and High Frequency (HF), can be combined to impact the total frequency and haptic output of the cluster.

The chart below shows three different frequency responses. The first, shown in blue, is the frequency response of a single DRAKE MF unit. The second, shown in yellow, is frequency response of a DRAKE Cluster made of two DRAKE MF units.

This second plot shows nearly double the output of the first plot based on the additional MF unit.

The third plot, shown in red, is a single DRAKE MF combined with a single DRAKE LF and a single DRAKE HF. The combined output has a much broader frequency range when compared with the single DRAKE MF frequency response.



The combinations shown in this graph are only for reference. The DRAKE Cluster can be configured with as many TacHammers as desired and in any combination of LFI, LF, MF, and HF.

For more information on DRAKE, download the [datasheet here](#) or visit our website <https://titanhaptics.com/DRAKE>.

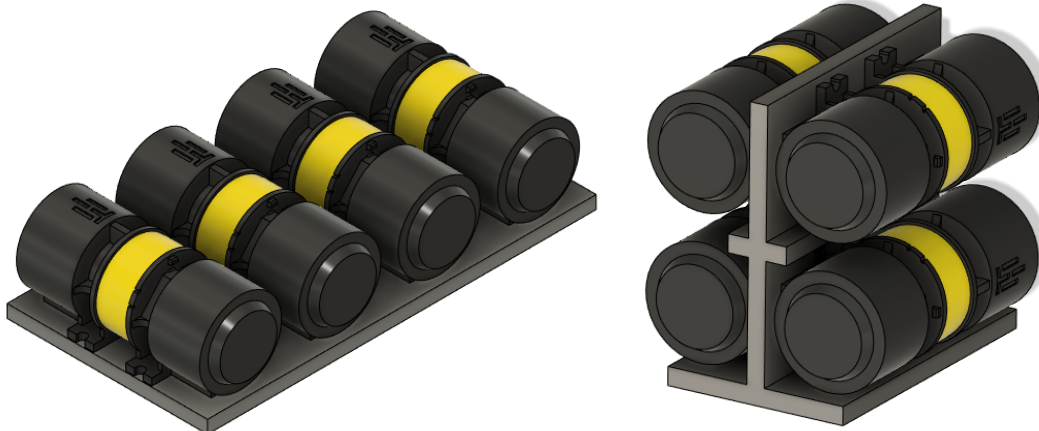
Mechanical Considerations

Mounting

TacHammer DRAKE comes pre-assembled with a double sided VHB sticker attached to the bottom of the unit. The user can peel off the backing and apply the motor to any surface where they would like to add haptics.

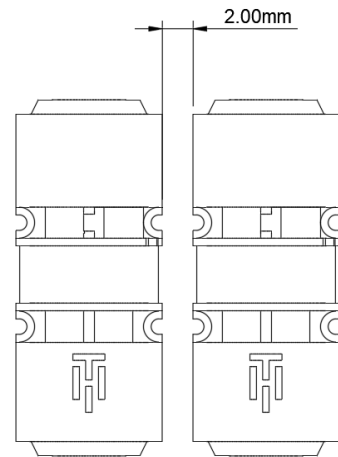
Below are two examples of two different configurations for a 4x DRAKE cluster. You can adhere the DRAKEs to a flat surface in a 4x1 configuration. You can also adhere the DRAKEs to a more complex structure in a 2x2 configuration.

We've included several example STEP files that you can use for your own rapid prototyping on our [website](#).



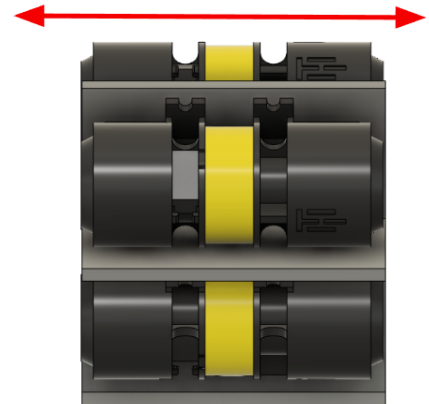
Motor Spacing

For maximum output, a gap of at least 2mm is recommended.



Direction of Operation

The TacHammer operates in an X-Axis direction. In order to maximize the strength of the haptic felt by the user, the direction of travel should be inline with the surface that the user interacts with. This is not mandatory, but it is recommended for the best user experience.



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