

Beginner's Guide to Drone Propeller Terminology

You're probably here because you think it's time to move on from the propeller set that came with your drone. Or perhaps you're flirting with the idea of building a drone yourself.

Either way, you'll need to familiarize yourself with the terminology of propellers first.

There's a bit more to drone propellers than meets the eye. They're specifically categorized based on their properties. And once you understand these properties, you'll have insight into how propellers integrate into a drone.

Plus, you'll be in a much better position to hand-pick a set of propellers for yourself.

In this post, we'll be covering how measurements are made and how you're meant to use them. All in a non-technical way. I'll also help you put to rest any doubts you may have about certain, commonly seen abbreviations.

What do drone prop numbers mean?

A large part of this post will be dealing with propeller numbers. But what exactly are they? You may have come across them if you've already browsed through the market.

Drone propeller numbers are a series of digits used to describe the propeller. These digits identify most, if not all, of the propeller's specifications, which include the length, pitch, rotation, and blade configuration. However, this number is often formatted in different ways.

The point is, they're meant to provide just enough information so you — as a pilot — know what to expect out of the propellers.

But there's a catch.

A propeller number is essentially of no use if you have no idea what the specifications *actually* mean. In fact, a lot of pilots make inaccurate assumptions early on in their journey and stick with them.

This is why I'll be going through the specifications, primarily the length and pitch, before we learn about the formats of propeller numbers.

How do you measure a drone propeller?

When we talk about measuring a propeller, we're referring to finding its size. Here's how it's done.

A drone propeller is measured by determining the distance between the furthestmost points on blades opposite to one another. This length is also known as the diameter. In other words, the propeller size is twice the distance from the center of the propeller hub to the end of one of the blades.

This length is measured in inches and is typically the first part of a propeller number.

So, now you know what measurement is used to categorize propellers into sizes. It's the diameter of the circle made by one complete rotation of a blade.

You might be wondering how else this measurement is used.

Well, it's crucial in the process of [choosing a propeller for your drone](#). Specifically for finding out whether the propellers are compatible with the rest of the components. We'll be delving into that towards the end of this post.

What is pitch in a drone propeller?

Next up is the pitch. It's a term *heavily* associated with propellers but newer drone pilots tend to skip over its concept completely. Here's a simple explanation.

Pitch in a drone propeller refers to how far it would move per one complete revolution. It's measured in inches and roughly controls speed (of the air leaving the propeller) and turbulence. Higher pitch results in less low-end speed, high top-end speed, and more turbulence.

To put it another way, a propeller with a higher pitch will travel further than one with a lower pitch in the same amount of time.

But that's not all. A higher pitch also means the propeller will draw more current from the battery and, hence, decrease flight times.

There are specific details on propeller pitch that are outside the scope of this post. I have, however, done a separate [post](#) on the topic. Make sure to check it out if you want to learn more.

How do you read drone prop numbers?

By this point, you know what the specifications mean and (at least) have a faint idea of what they're for.

But you still may not know how to read propeller numbers. And if that's the case, they're just a bunch of random digits telling you nothing. Here's how you can make sense of them.

You can read a drone prop number by understanding the format used in it. Most commonly, the first, second, and third digits correspond to the size, pitch, and blade configuration respectively. The digits are separated by an x. Sometimes, however, the size and pitch are written with no separation.

The blade configuration refers to the number of blades the propeller has. Let's take a look at an example.

A propeller number of 5x4.5x3 indicates the propeller has 3 blades, a 5-inch diameter, and a pitch of 4.5 inches.

The same information may also be conveyed in a different format: 5045x3.

In this case, you're dividing 50 and 45 by 10 to get the size and pitch in inches.

It's worth noting that not every manufacturer includes the number of blades in their propeller numbers.

What does R mean on a propeller?

Following the numbers, you may also see an alphabet — particularly an R or C. But what do they mean? Here's the answer.

R on a propeller means it has a clockwise rotation. Therefore, the propeller needs to be installed onto a motor that spins in the clockwise direction to ensure it works as intended. A propeller may also be marked with a C, which means it has a counterclockwise rotation.

A set generally comes with two different propeller models. One is designed to have a clockwise rotation, while the other spins in the opposite direction.

And if they're installed the wrong way around, the drone wouldn't even lift. This is because the spinning direction is particularly important to the [working of propellers](#).

What benefit does a BN prop have over others?

A "BN" label on a propeller indicates it has a bullnose edge. In other words, the propeller will have a blunted tip. What are the positives of this? Take a look.

A BN propeller has the most surface area out of all propeller shapes. Its main benefit is that more thrust is created, resulting in a more powerful lift. BN propellers are ideal for small racing drones as thrust is maximized without increasing the propeller size.

But don't get me wrong, a switch over to them wouldn't be *completely* positive. BN propellers draw more amperage. This makes them less efficient compared to the more popular propellers with tapered tips.

I mentioned above how BN propellers are used in place of larger propellers in drone races. There's one reason for this.

The frames of the small drones typically limit the propeller sizes that can be used. The next two sections focus on why this happens and what the limits exactly are.

How do you measure a drone frame?

The drone frame size comes into play when putting components together. Here's how you correctly measure a frame.

A drone frame can be measured by determining the distance between motors located on opposite ends. This reading is taken in millimeters. For example, you can measure from the front motor on the right to the rear motor on the left to get the drone frame size.

One thing to note is that manufacturers sometimes round up this measurement. So, don't sweat it if your reading doesn't *fully* match what the specification sheet says.

Frame sizes often differ by function. Nano drones, for example, generally have a frame size of 100 mm.

On the other hand, top-level consumer drones are equipped with more tech and have somewhat larger frames. The Phantom 4, a full-featured camera drone, has a frame size of 350 mm.

But why all of this *really* matters is because frame size directly relates to propeller size as well.

How do you know what size propeller you need for your drone?

So, we know that the frame size has some type of role to play. Here's the full explanation.

You can know what size propeller you need by considering your application and using the frame size of your drone. The latter would tell you the maximum propeller size that can be supported. This length is calculated using the cosine rule. Pilots, however, can simply use a size matching table.

The calculations aren't particularly complicated but, fortunately, you don't have to do them regardless. Here's a frame and propeller size matching table with pre-calculated values.

Frame Size	Maximum Propeller Size
110 mm	3 inches
145 mm	4 inches
180 mm	5 inches
220 mm	6 inches
350 mm	9 inches

If you do try to install propellers that are over the supported limit, they'll end up clashing with each other.

The table above is pretty helpful for pilots building their own drones. But if you're trying to replace the propellers on your consumer drone, you may be better off simply buying a set that's recommended for your model in particular.

Conclusion - where do you find your propeller number?

To wrap it all up, propeller numbers are clearly visible in product descriptions. But what if you don't remember the model of an old propeller? Here's how you find its propeller number.

You can find your propeller number labeled on the inside of one of the blades. While some details may be omitted, most manufacturers ensure the rotation is marked due to its importance. At the same time, the propeller number is always mentioned on the box and user manual the set comes with.

On the off chance you just *can't* seem to find your propeller number, don't panic. You've already learned how to measure the size and the shape is a clear indication of the propeller's rotation.

The protruding edge of the blades is *always* supposed to spin towards the drone frame.