

So ya wanna buy a mount

Barely a day goes by without someone asking on an astronomy forum “which equatorial mount should I buy” and naively expecting a definitive answer. Most are disappointed to hear 'It depends'. There are many mounts on the market these days and no single offering is the best one for all circumstances.

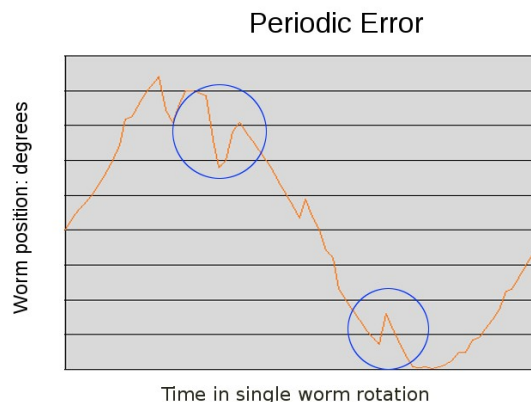
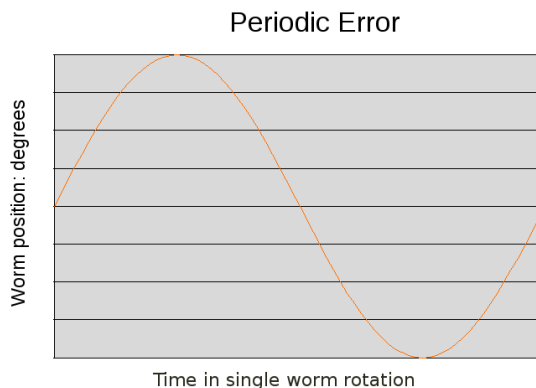
Manufacturers love to publish specifications and there are a few that prospective buyers fixate on when they have decided that a new mount is needed. Sometimes the numbers they think are important will give little or no help when deciding whether the mount will do with the task that they want it to perform. In the following few paragraphs I'll look at what people seem to think important (according to their questions) .

By far the single most stated desire in a mount is that it have low periodic error (PE). This is a tracking error caused by slight inaccuracies in the mount's RA worm gear. This can make the mount speed up and slow down very slightly which then causes a target to move back and forth in right ascension. Some mounts exhibit a lot of PE and some don't. Even within a specific make and model the PE will be different from mount to mount.

No gears are perfect. There will be some error in any gear you want to test but some are better than others. The premium mount builders can afford to buy the best gear-sets that are available AND pick the best in the bunches they receive. These mounts may state that their tracking error is within +/- 2 arc-seconds. Consumer mounts (the ones that Everyman can afford) may show PE values 7-10 times that. Are these bad mounts? No. So when is low PE important?

Most computerized mounts sold today have the ability to store the amount of error (Periodic Error Correction/PEC) and to correct it. This can take 20 arc-seconds of PE on a mount and reduce it into the 5-7 arc-second range or better. This is great IF you need low PE. So when DO you need low PE? I can only think of one circumstance where low PE would be required; when someone is doing unguided imaging. That's IT. For visual imaging periodic error is generally not even noticed by the observer and if you're using an auto-guider then the guider takes the error out of the RA tracking; that is its job.

So really, the amount of PE really isn't important but what IS important is the shape of the PE curve. In the following charts the one on the left is a perfect sine curve. The amplitude of the curve (within reason) is unimportant as any auto-guider worth its salt could guide out that error without breaking an electronic sweat. The chart on the right shows lumpy, bumpy PE with a few areas where the curve is so steep that an auto-guider may not be able to correct for the changes quickly enough. These are circled.



So... should you pay any attention to the PE numbers when you're looking at a mount? Of course, they tell you how accurate an RA worm and gear are being used **IN THE UNIT THAT THE MANUFACTURER MEASURED**. If the manufacturer says 'average PE' then you could get a mount with less or a mount with more. As previously stated the **SHAPE** of the curve is more important than the amount of error. You should ask several owners (try a Yahoo! group) to see how they find them and look at images taken with the mount you are interested in. If you like what you see, then by all means buy the mount. BTW... most guiders want you to turn the PEC off for guiding. This is a good rule unless the amount of PE is so great that no guider could remove it. In this case it's time to look for another mount.

Another number that is commonly quoted is capacity. This can be a really misleading specification as, unless the manufacture is telling you whether that is for imaging or visual use you could be misled. Also, is that capacity including the counterweight or is it just the payload? To be truthful, most capacity figures these days are a 'balanced payload' capacity. This means that this is the load that the mount can carry safely if properly counterbalanced.

If you are planning to use the mount for astro-photography then you'll need to know the capacity of the mount when used in that mode. Some makers assume that their mounts will be used in this method and therefore their stated capacities are for imaging. Others just state how much weight that you can stick on the mount and have the mount still be sort of useful. In that case the rule of thumb is to halve the capacity value for imaging. Ie: a mount that states a capacity of 40lb should really only carry 20lb if that payload includes a camera.

Unfortunately, there is no way of telling this without some work on your part. Again, Yahoo! groups and other forums are the best way to find out whether your intended mount is going to help you with what you want to do or not. Caveat emptor.

The last few things are very subjective. Manufacturers often give specifications for the diameter of the tripod legs, the types of gears or motors and other values for others of the bits and pieces that go into a modern mount. These can be very deceiving.

Common these days makers tout '2" steel tripod legs' but are the legs thin-wall or thick-wall tubing? This is important for stability of the mount. If by the mount comes with a pier is it properly braced internally and externally? For my money a tripod is better than a portable pier. The only way to test how stable a mount is is to load it and test it. The old 'pluck' test will tell you; put a star in the eyepiece and give the optical tube a good rap or pluck it. Count how many seconds that it takes to settle down. If it's still wiggling about after 2-3 seconds it needs work.

Manufacturers love to bandy names and buzz-words. Whereas some makers will give you the names of the people that built the motors and cut the gears (Celestron bought motors from Pittman and gears from Berg at one point for their flagship mounts, they don't anymore) some will just throw verbiage at you. One maker claims to have 'zero gap worm gears'. Having never heard of such a beast I searched and found... nothing. In this case who knows what they meant but darn, it sure sounds good. Some makers will tell you that their motor gearing includes cut steel gears (many are sintered metal gears). Is this better? Perhaps and perhaps not. Sintered metal gears can be just as accurate as cut steel; and in some cases more accurate. The lesson here again is to research and ask.

One fellow on-line wouldn't buy a mount because it didn't include the King tracking rate. His intended use was guided astro-photography and the King rate probably wouldn't help him at all. As a matter of

fact there probably aren't many (if any) mounts made anymore that will track at the King rate but he latched onto a specification and couldn't see past it. He was helped.

So, buying a mount? By all means look at the specifications and THEN start asking questions. Lots of questions. And be specific... "Does anyone use X optical tube on Y mount? I'd really like to ask some question and see some of your work". We're astronomers and we all love to show off what we do. You'll get an answer if there is one. Until then...

Clear skies

Rick Saunders
London Centre