MAXIBRIGHT Being under PAR isn't always a good thing

Introduction

For any serious grower the 600W ballast is the workhorse of their growing unit. It delivers maximum light and coverage. It needs to provide the best, highest quality output with the best economy. A high quality unit will deliver great results for years.

Maxibright ballasts have been one of our most popular products lines since we first introduced them in 1996. Since that time we have developed them in many ways. They have evolved through better build and more reliable components, to ensure we are always leading the market in terms of quality and value. This improvement has been the result of a lot of research, so the depth of our knowledge of ballast units is second to none.

As part of our research and development, we have spent some time looking at other 600W ballasts on the market. Many new products have appeared lately, often at competitive prices, and often promising to deliver you, the customer, the light that you need. However when we examined these, we found that the output that these units delivered was some way short of what was promised on the box. The outcome of these shortfalls, even small ones, seriously compromised performance. These shortfalls included poor build quality, cheap components, and significantly less light output. With only one exception, the most serious flaw we found was that ALL of the units below our benchmark ballast claiming to be 600W, were in fact not 600W.

In this article we are going to take you through the processes we followed. We are going to look at how we measured performance, the factors we used to judge performance and we are going to show our results. We are going to explain why small variations in power will lead to large variations in light quality and output. We are even going to tell you how you can do your own independent tests so you can find out for yourself.

We believe the Maxibright 600W ballasts are the best on the market. We know the care we have taken in their development and the pride we take in their manufacture. From our research, we know they will give you the best results. We believe that Maxibright ballasts are more economical than the many cheaper inferior models on the market.

We have focused on 600W ballasts as this is the most efficient and popular technology compared to 250, 400 and 1000W. However, exactly the same concepts apply to any wattage of HID ballast.

Please don't just take our word for it!

We want our customers to make informed decisions about their lighting and help them establish what "value for money" is. We have conducted our tests in our own test environment, but it's fair to say that a lot of basic claims can be verified using a simple energy meter. We'll show you how, later in this article. Our test methods, calibration, data and results have been endorsed by Venture Lighting Europe Ltd, who is the leading manufacturer of HID lighting in our market place.

What should a 600W ballast be then?

For a ballast to be rated at 600W and conform to EC specifications, it should provide 600W of power to the lamp, within +\- 3%. Typically, a 600W ballast will consume around 655W in order to allow the correct 600W to the lamp power. The 55W difference is mainly lost as heat in the ballast.

Why have you used PAR measurements for your tests?

Taking Lux readings (lumens/m^2) only gives you part of the picture when measuring light applicable to plant growth. Lux is only a measurement of what the human eye sees. Photosynthetically Active Radiation (PAR) on the other hand is widely recognised as a measurement that is more accurate when talking about lighting for plants, as it is focused on wavelengths between 400nm and 700nm. We have taken all our measurements in PAR units of W/m^2. Please see the following links for more information:

http://www.sunmastergrowlamps.com/SunmasterPARWatts.html
http://en.wikipedia.org/wiki/Photosynthetically_active_radiation

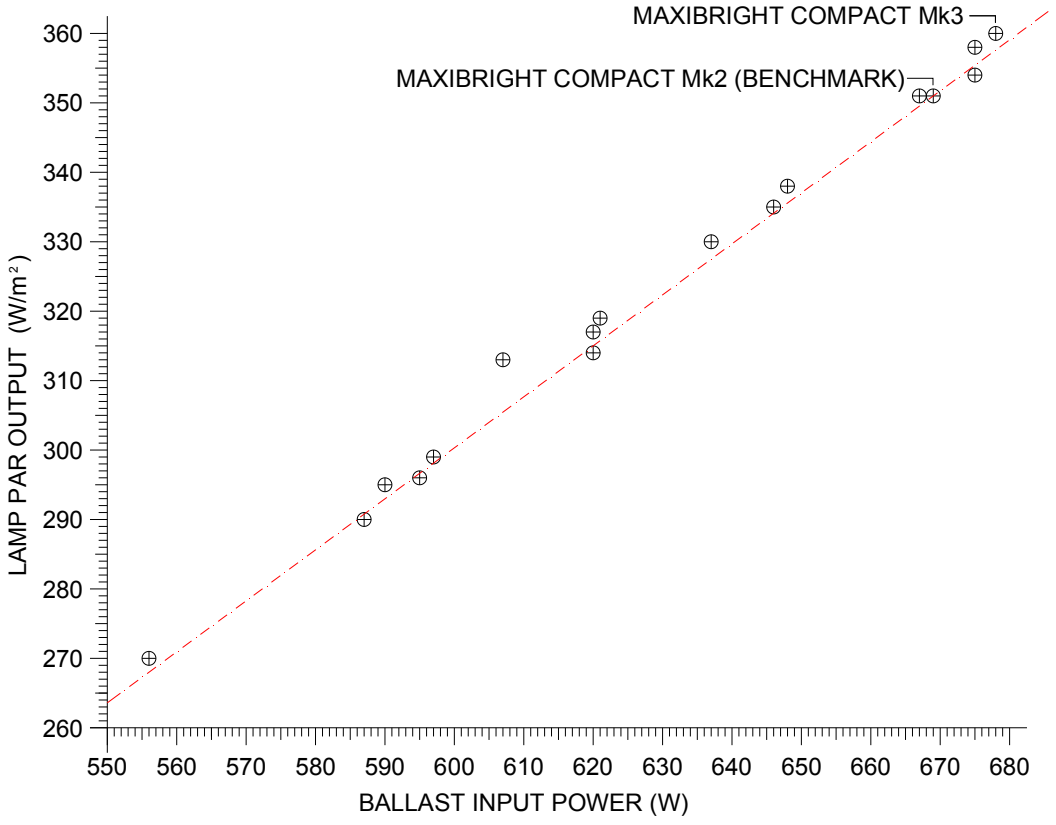
Why is it important for a lamp to run at the correct power?

We have found that ballasts which provide the lamp with the recommended power can deliver over 33% more light, compared to some of the sub-standard ones we tested. Providing the correct power to the lamp ensures that it runs at optimum efficiency and also that its spectral output is correct for optimum plant growth. Less good light = poor growth\yield.

Why do sub standard ballasts = less light?

It's because all major lamp manufacturers design their lamps to run at a certain power (watts). So if you don't deliver the correct power to the lamp, its not going to operate correctly, and the efficiency will dramatically decrease. We tested all ballasts currently available on the market and the graph below shows the results:

Chart 1



Compared to the benchmark Maxibright Compact Mk2, we found that the mean decrease of input power compared to the decrease in light output was approximately 1: 1.4 percent. This is illustrated by the red

line in chart 1 above. It's worth noting at this point, that the ratio of 1:1.4 we have observed, illustrates that the decrease in light output is far more than the decrease in ballast power consumption i.e. they are not proportional. As you can see, most of the ballasts tested consumed less power and therefore gave far less light output from the lamp. For example, the data point in the bottom left shows a sub-standard ballast that in our test consumed only 556W of power and gave only 270W/m^2 of PAR light. As a comparison, if a Compact Mk2 had been used instead, it would have consumed 669W and given 351 W/m^2 of light, which is 30% more light. If a Compact Mk3 had been used which on average consumed 678W and gave 360 W/m^2 of light, this would give 33% more light than the sub-standard ballast.

How accurate are our test results?

We calculated that our power versus PAR results have a maximum uncertainty of +\- 1%, which is very accurate. If you want to prove the values for yourself, please refer to our test method documents and you should be able to verify our results with ease.

How can I tell if a ballast is not doing what it says on the tin?

Using the energy meter we have provided (or any energy meter that is reasonably accurate), you can get accurate results for comparison with our data. All you need to do is cross reference the watts that your ballast's consumes with chart 2 on the following page. This will give you an indication of how much more light you would get if you used our Compact Mk2 benchmark ballast.

A simple way to test your ballast.

To see how much more light you could get from a Compact Mk2 ballast compared to a ballast of your choice, follow the steps below. If you are testing more than one ballast, ideally you want to keep everything in your test environment as similar as possible between tests. It's not essential, but to get the most accurate results:

- Use the same type of lamp that we used for our tests, a Sunmaster Dual Spectrum 600W.
- Run in the lamp for at least 100 hours from new. This is necessary to stabilise the lamp and ensure consistent readings.
- Repeat the tests more than once, preferably with different ballasts of the same type.

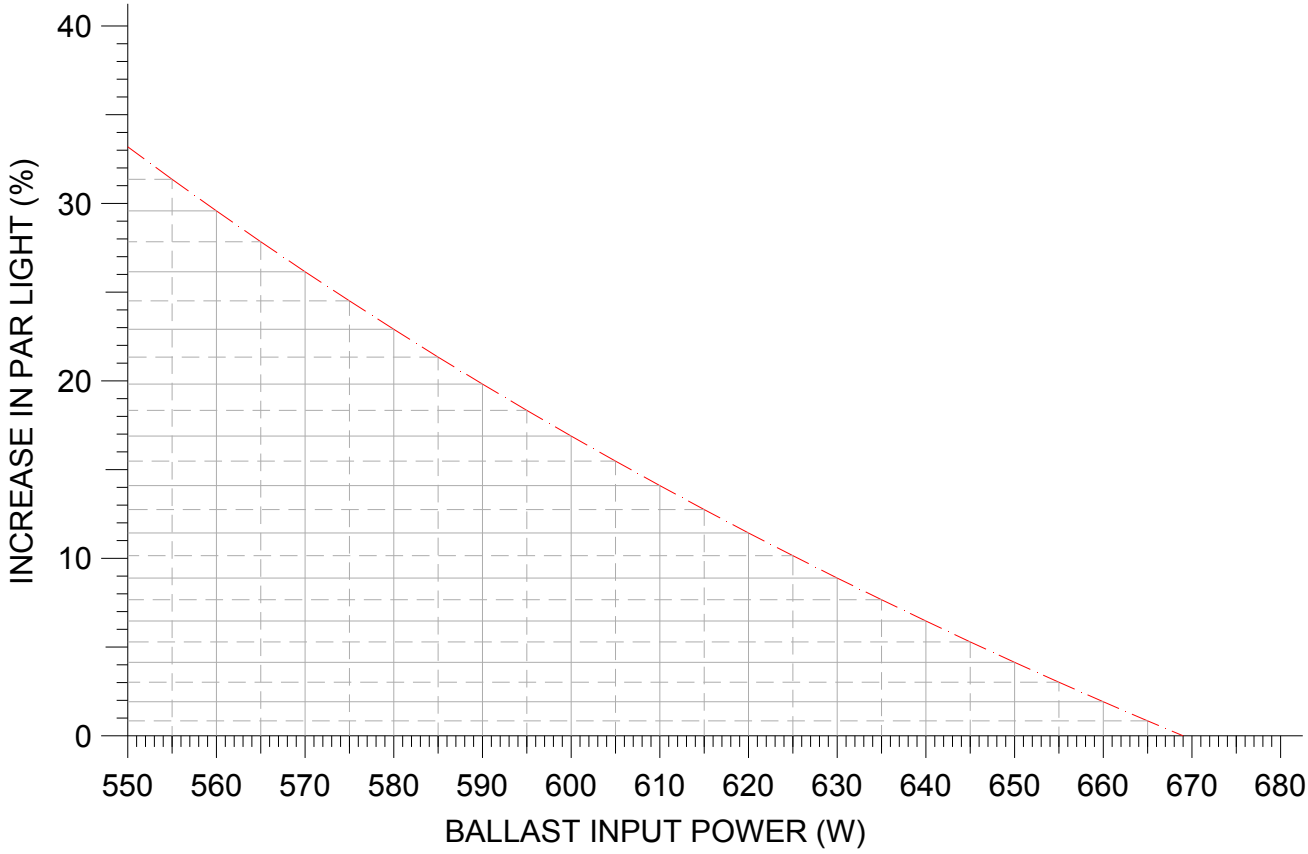
Here's the method for testing your ballasts:

1. In the process below, please connect all equipment according to your manufacturer's instructions.
2. Ensure the power socket is switched off and plug the energy meter into it.
3. Plug your ballast into the energy meter.
4. Connect the reflector and lamp to the ballast.
5. Turn the power on; allow the system to warm up for at least 30 minutes.
6. Select the power setting (Watts) on the energy meter and then when the value is stable, make a note of it.
7. Select the 'Volts' setting and make a note of the value. This can be any value from 216V to 255V, but usually it is somewhere around 240V in mainland UK.
8. You can now either use our online calculator at http://Maxigrow.com/BallastTesting.asp or continue from the step below.
9. If your voltage reading was not 240V, to be able to compare your power reading with our data, you need to adjust it. As a rule of thumb, for each volt difference, adjust your power reading by the same value in percent. Here's some examples:

a. If you recorded a voltage reading of 237V, this is 3V under 240V, so to compensate, you would apply 3% extra to your original power reading. If your original power reading was 630W, with an extra 3% applied this becomes 649W.
b. If your voltage was 242V, this is 2V over 240V so you would you subtract 2% from your original power reading. If your original power reading was 630W, with 2% less this would be 617W.

10. For ballasts that run the lamp correctly, you are looking for an (adjusted) power reading of around 655W.
11. Find your (adjusted) power reading along the bottom of the chart below and cross reference this to 'Increase in PAR light' on the Y axis, to see how much more light you would get from a Compact Mk2 600W.

Chart 2



So what is good value for money when it comes to selecting a ballast?

For the purposes of our tests, we have taken a Compact Mk2 600W as our benchmark. In our tests, it was not the best, but for a budget ballast, it's not far off. It also consumes more than 655W and we know that it delivers more than 600W of this power to the lamp. This is within the +\- 3% EC specification and we can confidently say that it does operate the lamp correctly, giving the light output that it should.

Let's take an example: one of the sub-standard ballasts we tested consumed 556W and in terms of light output (from the left hand side of the graph), we can see that our benchmark Compact Mk2 ballast would give you just over 30% more better quality light. Ok, so ballasts that consume 556W will use 17% less electricity than our benchmark, and will cost you less to buy, but we think most people would agree that this 30% loss in growth, yield and quality would not be a sensible economic choice. From the grower's point of view, for every 4 inferior ballasts used, they would only need 3 Compact Mk2 ballasts to get almost the same light.

The only good thing about a ballast that 'under runs' the lamp is that it will lengthen the life of the lamp ! We also believe that selling ballasts labelled as 600W that actually deliver less than this number of watts to the lamp, is misleading and possibly illegal.

It's also worth noting that some of our competitors claim that their ballasts run cooler than ours. This is true, in cases where their ballasts are not true 600W.

The bottom line is, if you want to guarantee that your ballasts are running the lamp correctly, giving the plants the best and most efficient light, choose a reputable brand such as Philips, Vossloh Schwabe, Venture, Sunmaster, Maxibright etc. Using the power meter provided, always make sure your ballasts consume around 655W so as they drive the lamp correctly.

Venture control gear is used in all Maxibright magnetic power packs. In our tests we found that there are some ballasts that are better than our benchmark Compact Mk2, but they cost more. In contrast, there's a lot more ballasts on the market that are worse than ours and in our opinion, very poor value for money.

If you have any questions or observations about our research, please contact our research and development team on rad@maxibright.com .