Morningstar's ProStar MPPT (PS-MPPT) Versus MidNite Solar's Kid (MNKID) TAKE2!

Shown with optional Meter and Wire Box

It was brought to our attention that Morning Star spent a LOT of time trying to do a comparative head to head test between the PS MPPT and our MidNite KID. Unfortunately they had an early KID and obviously did not understand they could update to the latest firmware, at no charge using our simple drag and drop interface. Like any KID ever built (In the USA by the way) you can always update the firmware to get all the latest features. Unlike a lot of other manufacturers MidNite will listen to the installers and distributors and make improvements to the feature set as the need is required. The Auto Generator Start with feedback was driven by a customer doing DC only systems.

We figured it would be nice to do the hard work for the folks at Morning Star, and save them having to go through the process again. Below you will find a more accurate comparison with a few extra points we felt necessary to mention. We added an appendix to give a more in depth explanation of the comparisons.

	Pro Star MPPT	MidNite KID
Highlights	12 or 24v battery	12,24,36 or 48v battery, Set points are adjustable from 9 to 64 volts
	120 volt input hard limit	150 volt operational and 162 volt safe input limit
	NO circuit protection for wiring	Built in circuit protection (Uses standard automotive fuses available anywhere)
	Plastic housing	Cast aluminum housing
	NO auto generator start	Auto Generator start with feedback
	No true input paralleling	True input paralleling for a single 60 amp controller
	Requires $55 wiring box to be code compliant	Code Compliant as shipped.

Continue reading for more comparisons

	Pro Star MPPT	MidNite KID
General	5 year warranty. not made in the USA. Designed for 15 year expected operating life.	2 year, NO HASSLE warranty. Made in the USA. Designed for 15 year expected operating life.
	25 amp and 40 amp version 12 and 24 volt battery ONLY 120 volt hard input limit	30 amp version (see appendix) Any nominal voltage from 12 to 48 volts Not bound by small ranges around 12 or 24 volts INPUT 150 volt max operational, 162 volt safe
	Metered and lower cost non-metered versions are available. The non-metered versions offer a less expensive solution for unattended sites.	Metered only version. Speaking of cost, the 30 amp metered Kid has a lower retail price than the non metered 25 amp PS-MPPT (See appendix).
	Weight is 3.1 Lbs (1.4 kg)	Weight is 6 Lbs (2.7 kg). We are not sure why less weight is better? We use a Canadian made aluminum casting, not plastic. These controllers are designed to charge 1000's of pounds of batteries so we are unclear why the 3 pounds lighter is a benefit?
	Allows surface mounting, without compromising access to wiring terminals.	No wire access when surface mounted. This is the original wall mount and the new wall mount with front accessible wiring terminals will solves this. The Kid is flexible in mounting allowing also for a flush mount for RV's and Marine use. (We will gladly replace any existing wall mounts)(See appendix)
	Generous space between terminals to allow for any wire bending. Maximum wire size is #2 when used with the optional wire box.	Maximum wire size is #8 when used with the new wall mount or #10 wire when used with Marine or flush mount kit. Keep in mind this is a 30 amp controller and safe installation requires circuit protection adjacent to the controllers (See appendix).
	Grounding is easily accomplished using the internal built-in ground lug. Cannot be used in marine or RV due to no UL458 listing.	Grounding is easily accomplished using the included internal ground connection. ONLY when used in a Marine or RV application, does UL458 require a bond on the aluminum back cover, so the included lug should be added.
	OPTIONAL wire box has five concentric knockouts [glands] to support wire bending and multiple conduit entries. (4) ½" / ¾" (1) ¾" / 1"	STANDARD wall mount has two ½" knock outs, Keep in mind these are small controllers and do not need a lot of wires or larger wires like a Classic. Also keep in mind that the wall mount adapter is plastic and includes plenty of room for many more knock outs.
	No circuit protection for the wiring included, requires external protection or risk of fire is present.	Circuit protection for the wiring is built in and included for PV Input, Battery Output and Load Output. It uses standard Automotive fuses readily available at any store. NEC still requires system over-current protection external to the KID, but since we find a lot of people fail to install over-current protection, the included fuses allow for a much safer installation.
	NON labeled LED indicators No battery capacity meter.	Well labeled LED indicators and battery capacity meter.
	100% Solid-State	99.99% Solid-State. We use a mechanical relay for reverse polarity and anti back feed protection. A Relay has very low insertion loss compared to a solid state switch and relays have proven to be VERY reliable over the many, many years of use in most charge controllers and inverters.

	Pro Star MPPT	MidNite KID
Performance	Low self-consumption; 0.6W (without meter) and <1W (with meter).	Lower self-consumption; <0.5 Watts WITH meter
	(Morningstar's original claim) Peak efficiency of 98% High Efficiency is maintained throughout the power output range, and low energy losses in the form of heat. This results in more power to charge the batteries and less heat dissipation which degrades electrical components	Peak efficiency of 97%. Speaking of more power into the batteries, it should be pointed out that two 250 watt modules will cause the 25 amp controller to current limit at 25 amps and the 30 amp controller to current limit at 30 amps (20% more power). What difference does this make? (See appendix for our explanation)
	Max operating temperature of + 60C without de-rate for 24v battery systems. De-Rate may occur at +45C for 12v battery systems.	The kid will operate at 60C as well. We chose 50C as the published number. At full power the Kid may De-Rate above 25C on 12, 24 and 48v battery. This depends on battery voltage and pv voltage (See appendix for more info).
	Nominal Maximum Operating Power rating of 1100W for the Pro Star MPPT 40 amp version. Array current input greater than the nominal rating will not damage the controller.	Nominal Maximum Operating Power rating of 1700 watts for the MidNite Solar KID 30 amp controller. Array current greater than the nominal rating will not damage the Kid (Or any of our controllers) SEE appendix.
	Open non-proprietary MODBUS & free software. (Requires additional components to interface with the PS MPPT).	Open non-proprietary Serial data available out of serial port. No extra hardware needed.
	Larger screen, Multi-Language, Logged data, performance metrics & diagnostic info (ONLY WITH MODEL WITH DISPLAY)	STANDARD two line alpha numerical display. Diagnostic info on screen and via LED indicators. Data logging and Multiple languages available starting Q1 of 2016.
Features and Capabilites	NO auto generator start...	Auto Generator start with positive feedback from the generator with NO extra wires to hook up. Includes 3 try lock out.
	NO battery state of charge meter available. You must use expensive 3rd party device.	FULL battery state of charge meter using the WBjr ($39 street price). Including battery temperature compensation (Battery capacity changes with temperature so meters that do not have temperature compensation will not display true capacity accurately).
	At a glance battery recent charge indicator not included.	Three LED at a glance battery recent charge indicator. Green LED = Full charge within the last 7 days. Orange LED = over 7 days since last full charge. Red LED = Over 2 weeks since full charge.
	Automatic or manual equalization can be chosen.	Manual Equalization only. We assumed these would be installed by a vast range of skill sets and chose not to support auto EQ due to the dangers of auto EQ. (Although we could add it as a feature if asked but honestly we have not been asked)
	Complete internal digital calibration. Self-verification and diagnostics during production and operation (NO calibration allowed)	Complete internal digital calibration, self-verification and diagnostics during production and operation. Calibration not normally needed, but allowed for fine tuning and more accurate application specific information.
	Includes battery voltage sense that connects directly to the battery for accurate, consistent voltage regulation. This prevents over or under charging of batteries. (Not sure how it prevents over charge as voltage drop would cause the controller to under charge?)	No voltage sense, but voltage drop would only occur at the beginning of the absorb cycle under full load on under sized wires. Our finding is the error is less than 0.1% on a properly installed system. Of course the error would go away as soon as the absorb amperage starts to taper off. (See appendix for more details)

Features and Capabilites	Pro Star MPPT	MidNite KID
	Can be used in positive ground system. (Most positive ground systems are 48v telecom systems.)	Can be used in positive ground system.
	Automatic electronic and reverse current protections and recovery are 100% solid state. No fuses or relays that need to be replaced.	Automatic electronic and reverse current protections and recovery are 100% solid state. We do have fuses but they are NOT for reverse current protection. Fuses will only blow when a circuit breaker would normally trip. The Morningstar will require fuses or circuit breakers also so that portion seems to make no sense. The Relay in the Kid is for controlling the PV charging. We use a relay like many other manufacturers and have never had any issue. Relays have very low insertion loss compared to the solid state alternative. (See appendix)
	Controller comes with all labels affixed. No additional time is needed to apply labels.	ALL Labels needed to conform with UL741 (Same listing Morningstar has) are factory applied. Labels that need field application are for UL458,Morningstar is not listed for Marine/RV application's so they do not have these labels.
	PC Connection can easily be established with Morningstar's RS-232 and USB adapters. (Optional)	PC Connection can be established with 3rd party, free software.
	Historic data is stored internally.	Internal Data logging coming soon Q1 of 2016!
	Automatic PV based lighting controller with multiple fully programmable ON/OFF settings.	Automatic PV based SMART lighting controller with a variety of different modes and ON/OFF settings. Please see the appendix for a complete comparison.
	Transient surge protection up to 4500 watts (solar, battery, load)	While the Kid does have minimal internal surge protection we chose not too mention it as it is too small to save you from anything with substance. We feel a better option is to put 4500 watts of surge capability in perspective, Our SPD 300 has around 98,200,000 watts of protection.
	Self-diagnostics are executed continuously and all alarms and faults are indicated on the display.	Self-diagnostics are executed continuously. Alarms and faults are indicated on the display and the easy to see LEDs.

Appendix

Versions: Morningstar has 25 and 40 amp versions The KID is only available at 30 amps

We chose 30 amps for a reason. The most popular and affordable solar panels are 250 watts. Two of these panels will fully load a KID. They will also fully load a 25 amp Morningstar, however you will only get 25 amps out of the Morningstar where as you will get 30 amps from the KID. As an example, use an average 6 hour day of full sun. Based on charging a 12V battery, you will get 1800 watt hours into your battery with the 25 amp unit each day, but you will get 2160 into your battery with the KID. The panels and batteries were the same for both systems. The KID costs less than the 25 amp Morningstar, so you are just throwing away 360 watt hours of energy by using the Morningstar in this scenario. The problem gets worse with the 40 amp controller because you need an additional 250 watt panel to fully utilize it. The 40 amp controller will definitely put more energy into your battery than a KID, but the 40 amp controller and the extra solar panel do not come for free.

Metered vs non metered versions:

You are flying blind without a display and cannot tell much of anything regarding the goings on of your system. Morningstar touts this as a more cost effective alternative to the more powerful KID. Well, then how come the 25 amp Morningstar ($397) along with its plastic conduit box ($55) costs more than the more powerful KID? Of course when you add the cost for the metered version of the Morningstar ($488) it is even more expensive. 25 amp Metered version plus conduit box = $543. That is $94 more than the 30 amp Kid. You cannot buy a non metered Morningstar and then go back to add the display. You have to buy the remote display that costs $104. Not only did the non metered, less powerful Morningstar cost more, but when you figure out that you really needed the metered version, you have to shell out another $97 for their RM-1 remote meter. That ought to make you really happy. This "less expensive" version will run you $100 more than the more powerful KID. Morningstar says that the non-metered version is a less expensive alternative for unattended sites. Make sure you bring something with a meter with you so you can figure out what is going on. Those unattended sites are expensive to get to and the lack of metering will only cause additional grief when attempting to trouble shoot issues.

Allows surface mounting:

We have a new wiring compartment coming 2nd quarter 2016 and we will happily give a free upgrade for anyone interested in having an easier wiring alternative for their Kid. The present wall mount adapter is tight. The new one pictured below allows for 8AWG cable and all wiring is done from the front with lots of wire bending room. We are in the midst of greatly improving that situation and we won't be charging any extra for it. Without the optional Morningstar wiring box, you cannot have an NEC or CSA compliant installation. Home owners insurance requires solar systems to be code compliant. Make sure you install things to be code compliant.

Optional wire box:

Morningstar has five concentric knockouts on their optional $55 box. We have only two on our wall mount adapter that is supplied with every KID. I suppose they beat us on this one. Oh wait……. Last time we checked, only two are usually used. If an end user is installing the KID and wants an additional hole for wiring, it isn't real tough to drill more holes in the plastic wall mount adapter. Just think…..the installer can then put the extra hole wherever he or she wants it! If the installer isn't capable of making a hole in a plastic box, then they probably shouldn't be doing the installation. We get calls from people doing their own installations every day. We help them all, no matter how inexperienced they may be. We use professional installers for our tech support staff.

These pictures show RV installs that the owner did. The KID doesn't protrude much from the mounting surface. The flush mount feature is unique to the KID.

100% solid state

Morningstar yes, The KID no.

Neither product uses a fan for cooling. What they are talking about here is the fact that we have a relay in the KID just like we have in the Classic. OutBack and others also use relays. The relay is a safety device that insures the battery isn't connected until the internal circuitry is matched to the PV array. This relay also provides absolute reverse battery protection. So…..what is wrong with a relay? They can be more reliable than transistors in this case and don't waste heat like transistors do. Both methods are ok. There is no real difference in performance with either method, so why was this even mentioned? There is no good reason to even mention the different methods for this circuitry.

Wiring space:

Morningstar has lots of wiring space because the controller doesn't even have a wiring compartment. It cannot be connected to meet the NEC code without purchasing an optional $55.00 wiring box. This plastic box is required to make a safe installation, so why are they charging $55 for a piece of plastic that should have been included to insure a safe and code compliant installation? The Morningstar has only one method of mounting. The KID was designed such that it can be cut into a wall like what you might want in a boat or RV. The KID also comes with a plastic wall mount adapter that allows it to be mounted on the surface of a wall. Another option is a Marine bracket available for mounting on a dashboard or other similar surface. It makes the KID mount like a fish finder in a boat. Three mounting options are available. Tooling is also underway that will allow the KID to be wall mounted with wired connections from the front. This was planned some time ago and is going into production in a few months at no additional charge. Anyone that would like the larger wall mount box can have one at no cost. Both the old and new wall mount boxes allow the installation to be code compliant. The KID can also be mounted code compliant without the wall mount boxes or with the marine mount bracket.

Efficiency **98% peak efficiency / 97% at full power** **97% peak efficiency / 95% at full power**

Measuring efficiency is a very difficult thing to do with any accuracy. It takes a lot of expensive equipment and knowledge of how to apply the tests. We have the equipment and knowledge. We also want to state that an efficiency measurement all by itself tells you very little about how much energy will be put into the battery. All MPPT charge controllers have very high efficiency numbers, but there is a lot more to it than the hardware efficiency number.

Due to the Morningstar attack on the KID, we ran the tests here at MidNite. Morningstar published efficiency specs that are all but meaningless due to a couple of factors: System match up and controller power output limits and they did not list the input and output voltages, nor did they list the test set up. This is so important in achieving accurate measurements. We at MidNite do not publish efficiency numbers. We choose not to do this because they are virtually meaningless. You can have the best hardware in the industry, but still have the worst performance of putting energy into the battery. Solar tracking is just as important as the efficiency of the power electronics. Matching the controller output capability to the PV source is probably the most important aspect of getting the most out of your system. Morningstar makes no mention of these facts. They typically are quite good at the solar tracking so we have no reason to doubt that they may have a bit better hardware efficiency than the KID. They are able to achieve this due to the fact that they do not support 48V batteries. They also only allow the input to go up to 120VDC. We allow up to 162 without damage to the controller. How can we do that? We use parts that support higher voltages. We could very easily make a KID that used the lower voltage parts that would increase hardware efficiency specs, but then the customer would not have the option of ever going to a 48V battery bank. We chose to include 48V as a marketing decision. Morningstar allows up to 120VDC on the input. This means you can put only two 60 cell PV modules in series. We can do three.

Here are the results of our own efficiency measurements and the test set up on how we arrived at these numbers. We did not have the 40 amp Morningstar to compare against. We will assume tests about the same as the 25 amp. The Morningstar claim of 98% peak efficiency is not what we measured. We saw 97.25%. Morningstar claims the KID had 97% peak efficiency. We only measured it at 96%. Peak efficiency is a really dumb thing to claim. This is what companies do to show really high numbers, but they mean nothing at all. The peak efficiency is measured at one power level (approximately 50% power), so it is pretty much useless unless you are always going to run your controller at half power. Morningstar claims 97% efficiency at full power (700W). We measured only 96.25% for the Morningstar and 95.75 on the KID. So at full power which is something these charge controllers do quite often, we measured 3/4% less than Morningstar measured on their unit and .5% more than they measured on the KID. So does the Morningstar have higher hardware efficiency than the Kid, yes it does, but not by nearly the margin they claim.

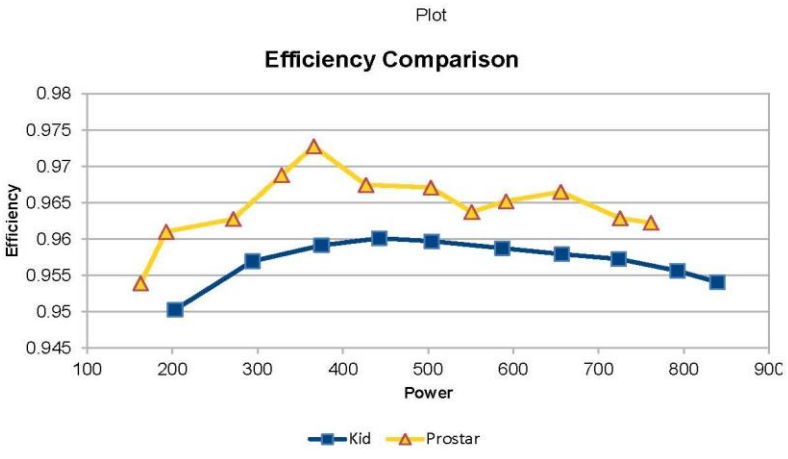
No big deal in any case as this is not an over-riding factor in putting energy into the battery. They did do better than the KID, but they do not support as high a voltage so we are ok with the real results. It is interesting to note that Morningstar said the KID is 2% less efficient at full power. We were quite happy to verify that they were wrong and the KID is only .5% less than the Morningstar. Perhaps Morningstar needs a lesson on how to measure efficiency?

Efficiency continued:

As mentioned above, the matchup between the solar array and the controller output capability is probably more important in this comparison than efficiency or tracking accuracy. The KID at 30 amps and the Morningstar at 25 amps will probably use the same PV array in most cases. The best match up for both of these controllers would be two 250 watt solar panels for a 12V system. Both controllers are capable of having more PV than they can process. This allows full power into the batteries early in the day and longer in the afternoon. So knowing that both controllers will be maxed out with PV, we need to look at the output. Morningstar at 25 amps will put 20% less energy into the battery than the 30 amp KID. This is simple math! A 40 amp controller would require a third solar panel, so you are now into a totally different price point.

They also claim that the KID gets too hot to touch. If that were the case, UL and ETL would force us to add warning labels on the heatsink surface. The KID stays within UL temperature limits that are safe to touch. Does the heatsink get hot? Sure it does. That is what it is there for. We measured the KID heatsink at 56 degrees C during the efficiency tests. UL allows up to 70C before requiring the warning labels. Morningstar hides their heatsink behind the plastic front so you can't touch it. This is a good idea since their heatsink just doesn't look as cool (no pun intended) as the KID heatsink, but their heatsink is now out of the airflow and will not be as effective as if it was out in front where the airflow is unrestricted. The KID supports higher battery voltages (48V) and higher PV input voltages (162V with HyperVOC and 150V operating) than the Morningstar. This means we put better parts in the KID to support these parameters. Thus the KID has a little less efficiency. Morningstar wasted their higher efficiency because they chose the wrong max current values. This is a major flaw in their argument.

What a motley looking crew, and these are some of our senior engineers! Jim and Andy are pictured here during some of the efficiency testing. Some of the equipment used are two Yokagawa power meters, two calibrated shunts, one Whizbang jr to gather data and verify against the Yokagawa meters, dump loads (out of view) to hold batteries at a stable voltage, a couple of 100V/20 amp power supplies, 24V battery bank and a Fluke 45 meter. We haven't figured out what function Jim's hammer was intended for?



Max operating temp:

Both products will operate at 60C. We chose 50C as the published maximum, but there is nothing to limit the maximum operating temperature. It will operate at 80C, but you just won't get any power out of it. The KID will de-rate as they claim. That is what pretty much all electronics do. As the ambient temperature rises, engineers turn the current limit down. Temperature performance on the KID is the same regardless if you have 12, 24 or 48V batteries. We do not understand why the Morningstar doesn't do as well at 12V? Funny how Morningstar never ever mentions things like 48V when comparing against the KID

The KID uses the UL required method for temperature testing. Morningstar has elected to go above that for standard operating temperatures. We keep the fets cooler by de-rating starting at 25C. This can improve reliability. Morningstar makes no mention of our 48V max operating temperature at 48V because they cannot support it. They also mention that their product "MAY" de-rate above 45C for 12V systems. How did they come up with the word "MAY"? Of course it de-rates.

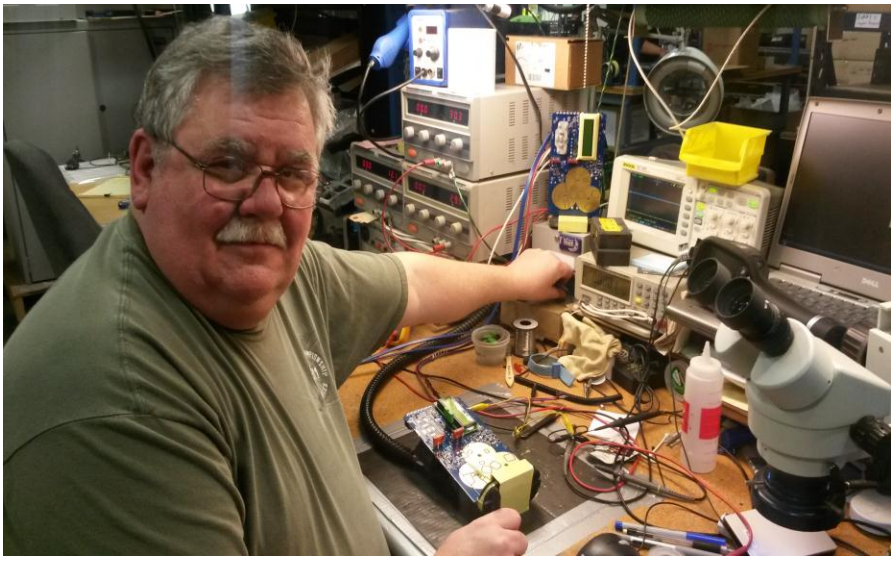
Nominal maximum operating power: **Morningstar 40 amp unit is 1100 watts** **Kid lists 800 watts**

This is one more misleading and false statement published by Morningstar We are talking about three different controllers that have three different power ratings. They chose to pick ratings that totally mislead the public.

A 40 amp controller will of course have a higher output than a 30 amp controller. It also comes at a higher cost. Why didn't Morningstar publish the max operating power of the 25 amp controller against the KID? Because it has a much lower power rating than the KID! Why didn't Morningstar mention the maximum operating power of the KID with a 48V battery? Because it is a much higher number than either of the Morningstar controllers. (Kid at 56V = 1680 watts max output power) One additional thing to remember is that in order to use a 40 amp controller, you will need more solar panels than is required for a 30 amp controller. Now you have additional cost in the system, so a direct comparison isn't really fair. There is no difference in the solar array when considering a 25 amp vs. a 30 amp controller. You will most likely have 500 watts of PV for a 12V battery. A 25 amp controller will not put as much energy into your battery as a 30 amp controller. Enough said.

Calibration:

Once again Morningstar got it wrong. Both companies ship controllers that are fully calibrated. Morningstar claims that the KID will lose calibration and will require user intervention to recalibrate. These statements are just flat out wrong. Morningstar must have hired a politician to write this flawed comparison. Neither the KID, nor the Morningstar have voltage measurement circuitry as good as a Fluke meter. Depending on your system, you can sometimes gain more accuracy by calibrating the voltage measurement to match your battery voltage. Morningstar does not allow this feature.



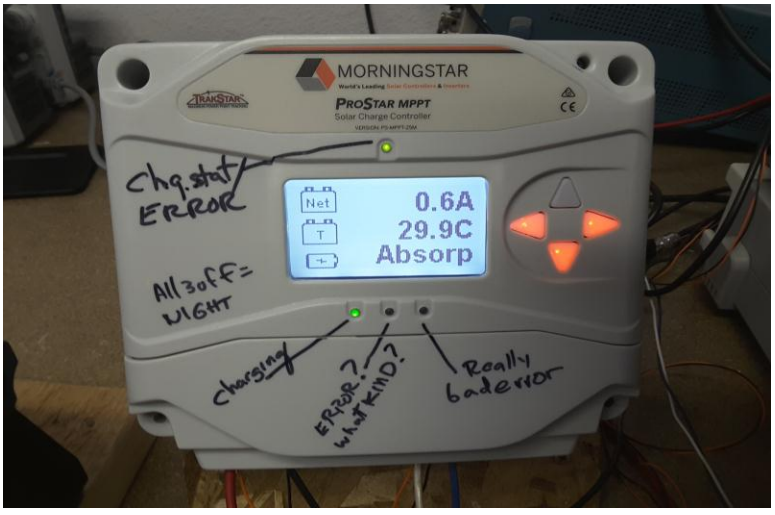
We calibrate the KID at our factory in Arlington, Washington. We have Hank to do this. Hank has personally tested and calibrated every KID we have built. We do not know who or what calibrates the Morningstar in Taiwan. The Morningstar may be calibrated by a machine. We could do that too, but then Hank wouldn't have a job. We feel that employing people in the USA is important. Too many companies are just interested in the bottom line and thus send jobs out of the country.

Battery voltage remote sense: Morningstar has it. The KID doesn't.

Remote sense can be a nice feature under certain conditions and MidNite may be adding this feature to future controllers, but this feature is far over rated. When pushing large amounts of current into a battery, there can be a voltage drop in the battery cables. It is low, but real. During this "Bulk" charge the controller is trying to put as much current into the battery as possible. The battery has not risen yet to the absorb voltage, so no remote sensing is advantageous. Once the battery reaches the absorb set point the charge controller switches from constant current to constant voltage. During the absorb period the current delivered to the battery is reduced further and further. The controller reduces current in order to maintain the absorb voltage and will put only the amount of current into the battery that is required to hold the battery at absorb voltage. As the battery gets closer to being fully charged, the current going through the battery cables is reduced to almost nothing unless you have huge DC loads. When current is low, there is no voltage drop across the battery wires and thus remote sensing is not required. There are special cases where remote sensing can give better voltage measurements. Remote sensing is not a bad thing, it is just normally not required. A five foot battery cable run using 10AWG wire at 10 amps will result in 0.1V difference. This error is not considered significant (.007%).

Labels:

We covered this before. Morningstar does not have all the labels we have because Morningstar does not have all the agency approvals that the KID has. The KID looks ridiculous when all the UL required labels are installed. We do install the ones we feel are important. Nothing bad happens if the user doesn't install the additional labels. Your hair won't fall out. Your tires won't go flat. Nothing bad happens, really. Here is a picture of the Morningstar as it was being tested for efficiency.



You may notice the lack of labeling for the four LED's. Labeling of these LED's could have been done with raised text on the enclosure. We hope Morningstar considers adopting our neat and tidy labeling. No tooling change required. People don't always have the manual at hand when looking at the controller and we thought it would be nice to label their LED's since they forgot to do this. By the way, take a look at the screen. Morningstar just invented a new word called " Absorp" Then again maybe the rest of the industry has got it wrong for the past 25 years by using the word "Absorb"? Use your spell check for "absorp".

Ease of setup / configuration:

Morningstar has plug and play options. So does the KID! Why did they say it requires calibration? If you reset to factory defaults, you will need to calibrate. The instructions are in the manual. Very few people ever reset to factory defaults. There is very little reason to do so. We have a ton of labels for the KID, which is true. The KID is listed to more standards than the Morningstar. For instance, the KID is the only charge controller listed to UL458 and the Marine supplement. That standard requires more labels. We put the ones on that we feel are important and allow the customer to put the remainder on if they wish. UL and ETL force us to make available all these labels. Morningstar has products that do not meet UL standards for labeling. We do not know how they get away with this. More power to them. We hate adding all these labels, but we are just following the UL and international standards. We did not investigate if this Morningstar controller has sufficient labeling. It just isn't that important to us.

Display features:

Morningstar does have a large display. It is a nice display. They use pictures for most everything. Pictures aren't always sufficient, but they are nice to look at. The KID has a 2 line, 16 character display that can display any message we desire either now or with any future code updates. We take issue when they say our display is complicated with limited data and information. We believe the opposite is true. Morningstar does have different languages that can be displayed on their display. We are in the process of adding Spanish and French language packs to the KID. Thank you Morningstar for pointing out this weakness. Kid language packages (available by downloading new code) will be available starting by the first quarter of 2016.

Lighting control:

Morningstar has multiple programmable on/off controls. The Kid has far more programmable lighting controls than the Morningstar. When we came out with the KID AGS version about a year ago, we added full functionality for lighting controls. Morningstar has one of the early KIDs that had very limited lighting controls. They must know by now that the KID far surpasses the Morningstar lighting controls, so why did they say what they did? Part of the KID lighting control circuit figures out what time it is so it can auto adjust when it turns ON and OFF as the season changes. Set it once and forget it. Check it out. The lighting controller is just one of the reasons MidNite gets awarded huge international lighting contracts.

There are a few things Morningstar left off the comparison, but don't worry we are going to list them here:

The KID supports 12, 24 and 48V batteries, or anything in between. You could charge a 38.9 volt battery properly if you so desired by simple button pushes of the set points. The Morningstar has 7 preset battery charger settings.

The KID safely supports up to 150VDC input. The Morningstar devices warn not to go over 120VDC

Twin Mode: This is a MidNite exclusive feature. When your energy needs grow, you do not need to throw away your KID for a larger controller. You can parallel the inputs and outputs of two KIDs for a single 60 amp controller. No other controllers in this class can claim this feature.

Sync Mode: When you need to have more than two KIDs in a system, you will want to use Sync mode. This mode was adopted from the Classic controller and it coordinates charging efforts among Kids. Each controller has its own separate PV input, but the outputs are connected to the same battery bank. So what you have here is a bunch of controllers charging the same battery bank. Why would you need a special communicating mode to do this? Let's say you have four KIDS in a system and over time your power needs grow. You could have four different controllers that do not communicate with each other, you could have four Morningstar charge controllers that don't communicate with each other or you could have four KIDs that do communicate with each other. Why is it important to communicate? When you have more than one controller in a system, operating independently, the controllers will all work at charging the batteries and are supposed to go to float at some point during the day. The problem is that the first three that went to float are now not contributing to put energy into the battery any longer. The first three are putting out 13.2V for example, but the last one is still in bulk mode putting out 14.4 volts. What happens is that the last controller may now not be powerful enough to keep the batteries at the absorb voltage.

Remember, the first three are not adding any power to the batteries, it is all left up to the last controller to satisfy the requirements to go to float. If it is not powerful enough to satisfy the requirements to stay in absorb for 2 hours or whatever the programmed time requirement is, then it will just stay in bulk mode for the entire day. It will do this every day and eventually boil the batteries dry.

Aux inputs: The KID has two aux inputs. The Morningstar has none. Aux inputs are useful for many different things like the Whizbang Jr. The WB Jr. is a true state of charge fuel gauge. The WB Jr. also allows for an accurate "end amps" final charge which insures the batteries were properly charged. Due to numerous factors like DC loads, it is not possible for any controller to know the full situation without a device like the WB Jr. The WB Jr. has a list price of only $59.00. Morningstar has no such device.

The KID has HyperVOC. This is a MidNite exclusive feature that allows the input to go above the maximum operating voltage. The maximum safe non-operating input voltage is 162VDC. HyperVOC is a non-operating condition reserved for those cold mornings where the PV input may go over the max input voltage until there is enough solar power to turn on the controller. The highest voltage that solar panels see is in the morning before the sun actually hits the solar panels. Once the sun hits the solar panels, the VOC drops and the controller turns on. MidNite Solar is the only company that has HyperVOC.

Aux Outputs: The KID aux inputs can also be programmed as aux outputs. Aux outputs are very useful. There is a list of uses for them in the manual, but the one that really stands out amongst all controllers is the auto generator start. The KID has a sophisticated control circuit to start and verify that the generator did actually start. If a generator start signal does not result in the battery rising in voltage, it will shut the generator off. This is a KID exclusive feature.

Load circuit modes: Manual, Dusk + time (extremely programmable and automatically adjusts for seasons), Night light, Day light, PWM divert, Float on, Float off, Diversion, Toggle, Night VAR Off (extremely programmable), Hourly, Low Battery Disconnect and Clipper (reserved for Wind KID).

Charge algorithms: Morningstar has but one charge algorithm. The KID has three selections available. These come in handy at times for special circumstances.

Seven labeled LED's: The KID has LEDs to the left of the LCD display.These LEDs can be turned on or off, even put in disco mode for Saturday Night Fever parties. Functions are as follows:
RFC = Received a full charge into the batteries within the last week.
1WK = It has been a full week since the battery received a full charge.
2WK = It has been two full weeks since the battery has received a full charge. This LED is warning you that the battery may be in danger of sulfation since it has been under charged for a couple of weeks. You should either dial back the loads, add more solar panels or do a Sun dance and pray for sun.
FLT = The battery is in float charge or if returning home after dark, you will be able to tell if the controller was able to reach float during the day. This is a good sanity check on charging status that can be done at a glance, every day if desired. You want the battery to achieve float status every day.
OVR = Over voltage or Over current. The KID had to go into HyperVOC mode due to an over voltage event. The event did no harm due to HyperVOC, but the LED gives you an indication of system performance. You can design the system to use every bit of the PV voltage available and on cold mornings not to worry about damaging the controller. If this LED comes on in the4 middle of summer, you have a system design issue and it should be corrected before colder weather sets in and causes damage. The KID automatically recovers from an over voltage event. No user intervention is required. It is just letting you know it had to do some work that normally would destroy other controllers. One thing that people like to do is to have more PV power than the controller is capable of outputting. So at noon, or thereabouts, the KID will sometimes limit the output to 30 amps even though there is enough PV power for more. You will then see the OVR led come on. Having more PV power insures that in the morning and afternoon, you get full power. Back in the days of $7.00/watt PV panels nobody added extra PV to a system. That is no longer the case.
ERR = This is the kind of error message you don't want to see. But hey, at least it told you that something in the system is really screwed up. You can call our tech support or get ahold of them through our website or ask on our forum or call the dealer. We don't get many calls for this LED being on!
CLP = When the blue LED is blinking, that means the load was shut off due to LVD. This LED shows you that the load is on. On the wind version it shows you when the KID Clipper is being activated to hold the turbine voltage down to a safe level. Yes, there is a wind and hydro version coming soon. It is in beta testing now.

The KID has more buttons than Morningstar. More buttons means fewer menus to go to in order to get where you want to be. We learned many years ago when building the world's most popular MPPT at the time that four buttons just wasn't enough. That is why the Classic and KID have 9 buttons. During the course of responding to the Morningstar comparison, we had to refer to the manuals of both companies. The KID manual is in general much more in depth and does a good job of detailing the additional features available on the KID. The Morningstar manual has been dumbed down. The MidNite website also has some very useful videos that demonstrate things like installation and use of the KID. The KID menu structure is anything but dumbed down. That is why we publish a full menu map in the manual to help you navigate all menus with ease.

System level overcurrent devices and enclosures: MidNite Solar is the leader in supplying enclosures and circuit breakers for system safety. Morningstar does not offer overcurrent devices or disconnects as is required by the NEC.

Ground fault protection: Morningstar does offer a nice ground fault protection system. The problem is cost. Their system retails for $222. MidNite offers a code compliant device for $69.00. The Morningstar DC-GFP is more elaborate than ours, but who wants to spend a bunch of money on something that doesn't help you put energy into your batteries? The DC-GFP's offered by both companies are necessary to meet code, but do nothing to help you keep your batteries charged. The current and voltage levels involved with these systems is so low that the ability to actually start a fire from faulty wiring is questionable anyway.

Weight:

Morningstar weighs 3.1 pounds **The KID weighs 6 pounds**

We are very proud of the fancy die cast aluminum extrusion we use. They are made in Vancouver BC at the same factory that makes the Magnum Energy inverter castings. The KID casting is a massive heatsink and enclosure. You can feel the quality that exudes from the cast enclosure. It is tough to brag about a thin extrusion and plastic enclosure from Taiwan, but Morningstar seems proud of that according to their write up? We just can't figure that one out. They did a nice job of the plastic enclosure though if you like that sort of thing. Morningstar does make the claim that their case is "high strength". MidNite makes no such claim, but we decided to test the strength on each just to see how we stacked up. You can see the results below. The wheel is attached to one of our forklifts! Each controller was subjected to equal loading. The KID sustained no damage and was still fully functional. The Morningstar did sustain damage and no longer functioned although we were extremely impressed that it did as well as it did. Our test was after all, pretty brutal.

We fully planned on adding the full Morningstar comparison here for your review, but since it has a copyright on it, we elected not to add it. For those that haven't seen what caused all the commotion, go to this link:

http://www.morningstarcorp.com/wp-content/uploads/2016/01/PS-MPPT-vs-Midnite-Kid-Comparison.pdf

Thanks,
The MidNite team