

Ebikeling 36 volt, 500 watt, 700C Conversion kit

Ebikeling Ebike Conversion Kits include all necessary components for installation:

- Hub Motor/Wheel
- Controller
- S830 LCD display
- Throttle
- Brake levers
- Pedal-assist system
- Torque arm
- Cable ties

eBikeLing URL for kit: <https://ebikeling.com/collections/ebikeling-ebike-conversion-kit/products/waterproof-kit-36v-500w-700c-geared-front-rear-ebike-conversion-kit>

Amazon URL for kit: <https://www.amazon.com/dp/B07MG76XWC>

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Lewis Balentine, Houston, Texas, July 2021

Conclusion

Since 1995 I have built at least a half dozen e-bikes (*my first one had Lead Acid batteries*). E-Bikes are my only form of transportation. Unfortunately while one E-bike was being rebuilt the motor failed on the other. The whole point of purchasing this kit was to get back on road with a quick, reliable solution. It turned out to be anything but that. This has been without question the worst experience I have ever had installing E-Bike hub motor system.

OH ... that question everyone always asks: maximum speed with a fully charged 36 volt battery, no cargo and a 135 pound rider is approximately 24 miles per hour I say approximately because I believe the speedometer is about 10% optimistic.

Front 36V, 500W, 700C Wheel and Geared Hub Motor

The wheel axle diameter is 10 mm. Steel forks can be filed if the axle does not fit into the dropout because of its slightly larger diameter. Please do not file more than necessary and make sure that it does not damage the forks. Aluminum forks can also be filed with extra caution.

Aluminum rims have openings for a schrader type valve.

Recommended tire width: 28C, 32C

Rim Width (Inner): 19mm

Rim Diameter (outer): 633mm

Rim Diameter (inner): 583mm

Spoke: 234mm 12G Carbon Steel Copper Nipples
Front Axle Length 165mm (6.5 inches)
Front Dropout: 101mm (4 inches)
Motor Wheel Weight 7.4lbs (3.36 Kilograms) **WRONG! It is 9.43 pounds !**
Motor Torque: 40 Nm Efficiency > 80%
Motor RPM (Nominal): 300
Motor Hub Diameter: 158mm (6.22 inches)
Motor Magnets: 20
Peak Power: 0.84kW

Ebikeling does not give much information about the motor and does not even have any photographs of the left (*disk*) side. The available photographs for the right side are poor quality and low resolution. They provide a bit more information about the rim. Carbon steel spokes ... seriously??? Copper nipples?? Copper is soft and expensive. Surely they mean brass. The motor is an ugly black hub laced with thick black spokes to a rim with black center section. Fortunately the rim can accommodate either rim (*caliper*) or disk brakes.

One can not use acorn nuts with this motor because the cable runs through the center of the 12mm axle. **Yes, axle diameter given above is wrong.** It should say "*The wheel axle width is 10 mm*". The flanged hex nuts are M12 by 1.25mm and require an 18 mm wrench. The motor wheel assembly weighs 9.34 pounds (*a full 20% more than the 7.4 pounds claimed by eBikeLing*). With the same 700x25C tire and tube the eBikeLing wheel is 2.85 pounds heavier than my previous Bafang SWXU wheel assembly. That is a 40% increase in weight that I can feel on every crack in the pavement. Worse yet, now I get "*pinch*" flats on the front wheel ... even with a 5 PSI increase in tire pressure. By the way, you will need steel tire levers to get tires on and off this shallow, narrow rim (*the plastic ones just bend*).

Note: One thread on endless sphere observed that this appears to be a Bafang "8-Fun" SWX02 hub motor.

Ebike 36V 500W Waterproof Brushless Controller

36V Controller with 22 Amps suited for 500-750W kits. Suitable for 810 LED and S830 Displays. Match the controller with your original received in the kit or match voltage and amps with the motor you purchased alone. Be sure you have 810 LED or S830 LCD display then choose controller accordingly. The controller comes with an SY60 male type battery connector (Compatible with XT60 connectors)

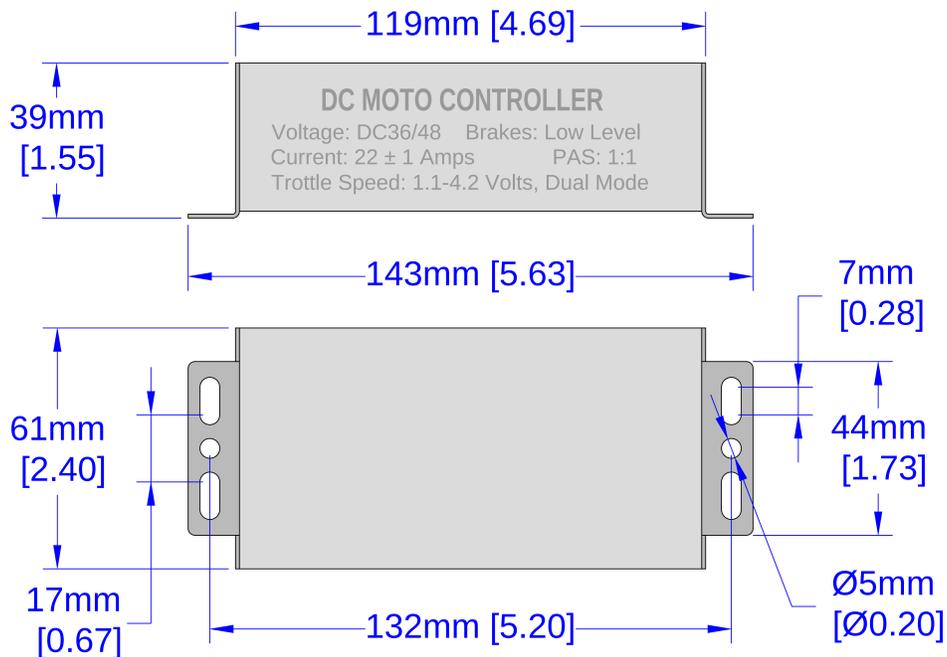
Ebikeling Electric Bicycle we have the controller with 3 different voltages and 4 different power outputs. Match the controller with your original received in the kit or match voltage and amps with the motor you purchased alone. A larger Amp controller can always be used without any side effects other than cooler operation, a motor will pull the same Amps under same voltage. The voltage of the battery and controller must match.

**** update**:**

eBikeLing have revised their controller software and disabled parameter P14
The latest versions of SW900 and S830 displays adjust the current automatically.

The controllers are offered in 500 watt (36/48 volts, 22 Amps), 1200 watt (36/48 volts, 30 Amps) and 1500 watt (36/48 volts, 35 Amps) versions. The 500 watt controller weighs 12.8 ounces. It is not totally water proof. The back of the SY60 power connector exposes the power pins to the environment. That can be remedied with a bit of RTV. One also needs caps (or heat shrink) for any connectors not used. I recommend a touch of lithium lubricate if you want to be able to separate those connectors in the future.

The thing to be acutely aware of is that this series of controllers is driven by the PAS (*pedal assist system*). The throttle system operates by feeding the PAS system. Thus every parameter for PAS affects the throttle as well. Even if one does NOT install the PAS hardware, the PAS parameters must be set appropriately for the throttle system to function at all. This is poorly covered in the documentation (*in some cases just plain wrong*). The PAS level also controls the maximum throttle speed.



S830 Waterproof LCD Display

Ebikeling LCD Display have multiple functions serving as a trip computer as well as controlling the whole ebike system on the conversion.

E Bike S830 LCD Display have multiple functions serving as a trip computer as well as controlling the whole ebike system on the conversion. These displays let the rider choose the assist level they desire if PAS is installed. They show remaining battery, current speed, average speed, maximum speed, total and trip distances. Wheel size can be changed for different applications.

According to the manual the nominal voltage can also be switched between 24, 36 and 48 volts. See the last page of this document for a complete list of parameters and their settings.

URL to Download Current Manual: <https://ebikeling.com/pages/lcd-s830-manual>

URL for YouTube Video: https://youtu.be/KtEm_WXV9fw

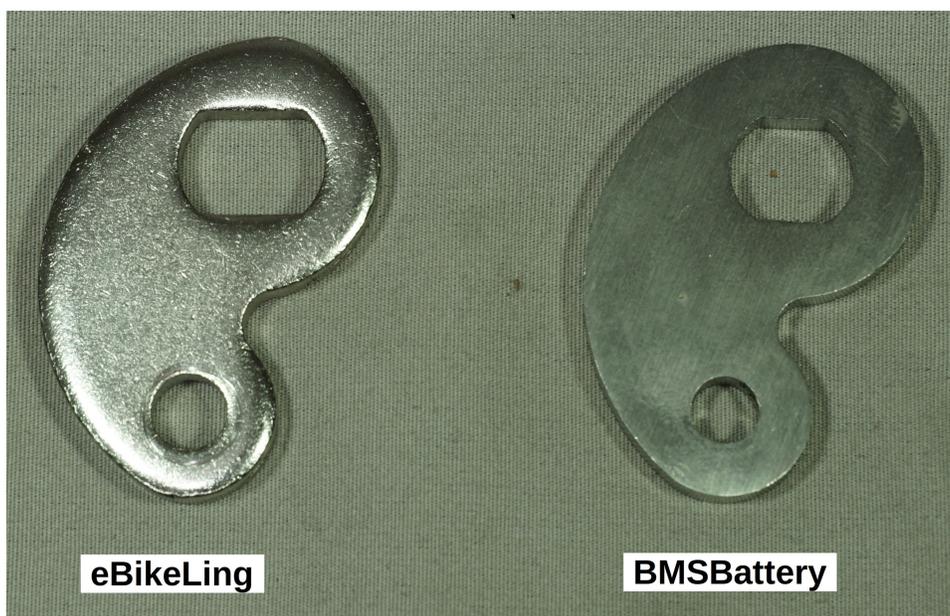
Universal Laser Cut Torque Arm v2

Universal torque arm kit for hub motor installations. A must for high power 1000W+ kits which will be installed on front dropouts. High-quality steel laser-cut arm, hub mount, and c-clamp.

While the pictures of the kit show two sets of Torque arms, the kit only comes with one. Ebikeling list two V2 Torque arm kits with different prices. However I can not see any difference between them and the descriptions are exactly the same.



The Torque arm provided is neither laser cut or high quality. It is best described as SLOPPY! The pictures used by the eBikeLing marketing department on their web site and in their sales literature are NOT of the actual part that they ship in their kits.



The Torque Arm on the left is from eBikeLing and it is stamped (*the tooling marks are obvious*). The hole measures 10.25mm by 14.0 mm on the front face. It is a bit larger on the rear face (*another result of having been stamped out*).

The one on the right is a six year old Torque Arm from BMSBattery and it was actually "Laser cut". The hole measure 10.03 mm wide by 12.05 long ... the hole size is the same for both faces.

Note that the flats on my axle measured 9.75mm face to face and the OD of the M12 by 1.25mm threads is approximately 11.8mm. This is how a Torque arm should fit:



Cables

The Juliet 9 pin (*equivalent to the HiGo Z910*) male to female motor extension cable is 66 inches long. At best the phase power conductors in this extension cable are 16 AWG. The 8 pin one-to-four breakout cable is 60 inches long. With these two cables there is six to seven feet (*two meters*) of extra cable between the front wheel and the handle bar to stuff somewhere. Do they offer shorter cables? The answer is no. The eBikeLing approach is to mount the controller at the rear of the bike so one can run the cables back and forth along the length of the frame.

The problem with weather-proof over-molded cables is there is no way to test the various signal and power conductors without having a set of suitable diagnostic breakout and/or patch cables.

Documentation and Tech Support

Credit where credit is due: eBikeLing tech support responded quickly to email inquiries. However the validity of the patronizing response can be subject to question. I believe the only qualifications required are the ability to read their web site as well as read and write email. An understanding of the technical aspects of their product(s) does not seem to enter into the equation.

I saved the worst for last. The documentation is more a source of problems than a valid product reference. Some parts are just plain wrong. There are also conflicts between the PDF documentation and the information on their web site. One of those conflicts was the source of it taking me four days to get this system to actually function ... and that was discovered by a fortunate accident.

They are loath to provide accurate or complete documentation on any part of their system. I can not determine if this is because of a lack of knowledge of their own products or simply fear of providing the customer with too much information. As an example just try to find a complete list of the error codes for the S830 display. The few that you do find may be wrong.

Error code **10** indicates that hall sensor connector is not connected properly. Check wires in the motor connector carefully, push the wires in all the way to make sure they are connected properly.

That error code was actually generated as a result of a loose connection between the controller and the one-to-four breakout cable. Another two hours wasted.

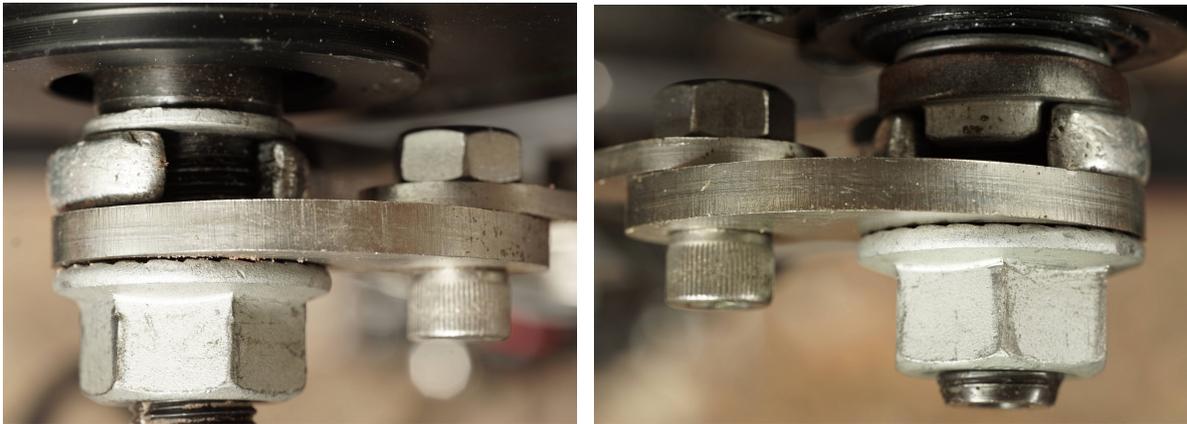
The last page of this document contains information about the S830 system parameters as best I can work them out (*circa July 2021*)... I believe it to be more accurate than what is available from eBikeLing.

Installation

I installed this front motor wheel assembly on a 1990 Miyata CT7000 road bike. This is a very light weight unique carbon fiber over aluminum frame road bike with a narrow polished aluminum front fork. Some might say that this assembly is not intended for a road bike but it came equipped with a 700C rim (*ISO 622 mm*) with 19mm inside width and recommended tire size of 28C. That is the common tire for road bikes ... no so much for comfort, hybrid, cruiser or mountain bikes. My frame happens to max out at the 25C width. The motor barely fit within the confines of the narrow fork.

Note: The motor installation photos were taken with the bicycle frame upside down resting on the handlebar and seat.

These first two pictures are intended to illustrate the hardware stack used on each side of the motor to center the wheel in the 100mm wide fork.



The first picture is the cable side of the motor (*normally the right side of the bike frame*). The stackup consists of: the motor, 1mm thick washer, fork, torque arm, 12mm flanged nut.

The second picture is the disk brake side of the motor (*normally the left side of the bike frame*). The stackup consists of: the motor, 1mm thick washer, tabbed anti rotation washer, fork, torque arm, 12mm flanged nut.



The keen observer should note that the width of the motor precluded the installation of “two” tabbed anti rotation washers. In fact the one that was installed had the back side ground off a bit to get it to fit in the available space. This makes the proper installation of two properly sized torque arms all the more important.

Those are 1/4-20 hex socket head screws and hex nuts in the torque arms. That happened to be the size I had available in stainless steel hardware (*as opposed to M6*). There are no lock

washers but the 12mm axle flange nuts and torque arms fasteners all got LOCTITE 222 (243 *might have been a better choice*) applied during the final assembly.

During a test spin of the wheel a few unusual noises were detected. On the disk side the plastic spacer ring under the used disk mounting screws was removed. On the cable side I discovered that the screws that hold the motor together were barely tapping against the band that held the torque arm in place. A bit of grinding was needed to reshape that band to avoid the interference. I now have about 1.5mm of clearance (*for reference, those spokes are 2.5mm in diameter*).



These next two pictures were taken after final installation and everything had been torqued down in place.



Note the “*drain hole*” added to plastic acorn cover ... just in case.



I had to fabricate a new band to hold the 'new old stock' BMSBattery torque arm. I will replace it with a proper stainless steel version when I can scrounge up some material.

I also fitted a speedometer magnet and wireless sensor so I would have something to compare the readings from the eBikeLing S830 display to. In hindsight a 'wired' speedometer would have been a much better choice. The hub motor interferes with the wireless speedometer signal transmission.



While the bike was upside down, I also measured the actual circumference of the mounted tire (*inflated to 3 BAR or 45 PSI*).



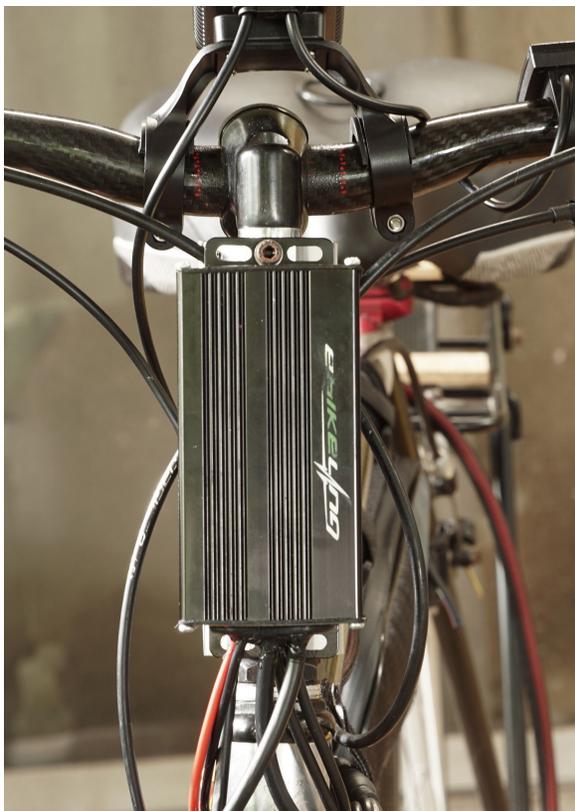
Given circumference (C) = 84.125

$$\text{Radius} = \frac{C}{2\pi} = 13.388909587606$$

$$\text{Diameter} = \frac{C}{\pi} = 26.777819175211$$

*"That concludes this portion of the installation.
During the intermission please consider visiting our snack bar in the
lobby for some delicious, refreshing treats."*

I chose to install the controller on the front of the steering stem. The primary reason was to get it out into the open air for cooling. The secondary reason was to reduce the cable run to the motor once the system has proven to be reasonably reliable. Cutting the cable length by half has the about the same effect on wire resistance and power loss as as increasing the diameter of the phase conductors by 50% (*doubling the area*).



That left the problem of dealing with all that excess cable. This is a TEMPORARY solution.



Remember that separate speedometer I spoke of earlier? It had to be installed ahead of the handlebar and far to the left. Apparently the motor/controller puts out a LOT of local electronic noise.



The eBikeLing S830 is consistently about 10% faster than the DINOKA Bike Computer (*except at zero*). The S830 is also slower to respond to changes in speed. The monsoon has not let up enough for me to check the odometer reading. Given the poor quality of the eBikeLing documentation I have a bit more faith in the DINOKA Bike Computer. Ultimately the only way to verify the speed and distance is to build some kind of MPU based single board computer that can record the actual RPMs of the front wheel.

If the S830's displayed speed and distance are inaccurate then that pretty much makes it a useless device except for programming controller and turning on the system: A big, Fancy, expensive On/Off Switch.

For the record: I did not install the PAS or brake hardware. I would not use the PAS system and I am smart enough to back off the throttle when I apply the brakes.

Years ago the first Chinese E-Bike motor systems that were marketed were simple and reliable. Connect the motor, controller, battery, throttle and they worked. Then they got more complicated with new features, display units and lots more wires. The minimal instructions/diagrams were written in "*Chinglish*" and included such off the wall wire labels as "*door alarm*", "*teaching system*" and "*starter switch*". The biggest challenge was figuring out what was actually supposed to be connected to those wires. That problem still exists today. Now the wiring for the newer generation systems is a bit simpler but there has been little or no improvement in the quality documentation content.

Once all the hardware was installed, it took four long, frustrating days to get the throttle to spin the wheel. See system parameter **09** on the next page.

eBikeLing System Parameters:

Turn on the system display by pressing and holding the **[MIDDLE]** button for 3-5 seconds.

Press and hold the **[UP]** and **[DOWN]** buttons for 4-5 seconds to **enter** the parameter settings

Note: *Parameters may be set without motor attached.*

- P01) Backlight Brightness: 1 to 3 (3 = *brightest*)
- P02) Distance Units: 0 = Kilometers, 1 = Miles
- P03) Battery nominal voltage: 24, 36, 48, 52 or 72 Volts
- P04) Display hibernation time (*minutes*): 0 = never
- P05) Number of PAS levels: 3, 5, 9
- P06) Outside diameter of tire (*inches*): 700Cx25C = 26.8 inches
- P07) Number of magnetic pulses per revolution: 0 to 100
Default was 47. This is one parameter where valid information is sadly lacking.
Geared Hubs require this number to be set to "1".
- P08) Speed limit (*Kilometers per hour*): 0 to 100
16 km/h = 10 mp/h, 24 km/h = 15 mp/h, 32 km/h = 20 mp/h,
40 km/h = 25 mp/h, 48 km/h = 30 mp/h, 100 = no limit
- P09) Zero start delay: 0 = delay, 1 = no delay
Zero start delay = 1 (no delay) COMPLETELY disables the throttle.
- P10) Drive mode: 0 = PAS, 1 = handle-bar throttle, 2 = both
- P11) PAS start delay: 1 to 14 (13)
- P12) Pedal Assist start strength: 0 to 5 (3)
- P13) Number of PAS magnets: 5, 8 or 12
- P14) Motor Controller Current Limit: default is 12 (*mine is set to my = 20, ignored*)
The latest versions of eBikeLing SW900 and S830 displays adjust the current automatically. This also means one is UNABLE to limit the output of a larger controller (like a 30 or 45 Amp controller to run at 22 amps in a hotter climate).
- ~~P15) Motor Cut Off Voltage~~
- P16) Odometer Reset: Long press (5 seconds) to reset Odometer
- ~~P17) Power choice function from 250W-1000W~~
- ~~P18) Factory Reset~~

Parameters that are ~~struck through~~ are not available on current S830 display.

Values that are underlined are the default (*or what I have set my system to*).

(my system is an eBikeLing 36 volt, 700c, front geared hub motor/wheel)

Press and hold the **[UP]** and **[DOWN]** buttons for 3-5 seconds to **exit** the parameter settings.

When the vehicle is parked, long press **[DOWN]** to enter 6km/h **"Walk"** mode.

When the vehicle is traveling, long press **[DOWN]** to enter real-time **"Cruise"** mode".

Long press **[DOWN]** or move **[THROTTLE]** to exit either mode.

HINT:

"Walk" mode does not require either throttle or PAS hardware (however PAS must be enabled). If you are troubleshooting a wheel-motor that does not rotate then try the **"Walk"** mode.