

## FULL TITLE

Full Comprehensive Complete wiring guide and review for a 48 Volt 1800 Watt Brushless DC motor (BLDC) with hall sensors and 33 Amp 1800 Watt sensed controller ● motor model my1020 BLDC ● controller model BY15WF01-A

## ABSTRACT

After getting a motor with hall sensors, a sensed controller and throttle but no more information, I set out to answer a lot of questions, engineer some bench tests and gather data. Following my steps and suggestions will ensure your build is a success. Before starting, remember the basics: be patient, go slow and unit test everything!

Hardware under test is similar to – but not exactly – Fig 1.



Figure 1 Hardware under test

List of electrical support equipment:

**Power Supply** Power Ten Inc 3350D-6010

**Power Meter** JZCreator 130Amp

**Strobe Light** Strobotac 631-B

**Fuse** 1/8th amp glass bus type (Every function gets wired through a fuse)

After contacting the seller, they sent a wiring diagram. I marked up the original. Now, each wire is numbered, typos are fixed and values updated based on actual testing, see Fig 2. After looking at many disassembled controller pictures online, I suspect the letters often following colors, i.e. Grey XS, are printed circuit board silk screen labels.

客户	上海司顺电子商务有限公司	Model	15 MOSFET 48V 1800W
文档编号	QYP15WF01-A	SKU	1800WSDJJKZQJTSBVO
配置	Voltage:48V, Off voltage:39V, cruise, speed limited, Low-level brake, Current 30A ? 42V		
名称	图样	线位说明	CHK01-A
Power	7.8-2 插片座	11: Black - 22: Red +	
Motor Phase		3 U:Yellow    4 V:Green    5 W:Blue	
Hall		61:Red    2:NCC    73:Black 84:Yellow    95:Green    105:Blue U:Yellow    V:Green    W:Blue	
E-Lock		1:Orange VCC    2:Red P+ 11    12	
Display		13 1:Yellow    14    15 2:Red 5V    3:Black GND	
2.8-9 集成		1:NCC    2:NCC    163:Purple12V 4:NCC    5:NCC    176:Green SL 7:Yellow    118:Black NGD    9:NCC (Low-level brake:6:Green +8:Black)	Black GND
converter		1:Black GND    2:Purple    3:orange VCC 20    21    22	
Throttle		1:Brown 4.3V    2:Black NGD    3:White SD 23    24    25	Black GND
cruise		1:Blue Q    2:Black GND 26    27	
Reverse		1:Brown DC    2:Black GND 28    29	
Speed limited		1:Grey XS    2:Black GND 30    31	
2 speed		1:Yellow K1    2:Black NGD    3:Blue K2 32 (don't use it)    33    34	Black GND
charge		1:Red P+    2:Black GND 35    36	
防盗电源		1:Red P+    2:Black GND 37    38	

Figure 2 Wiring guide, corrected.

IDENTIFY all connectors by matching colored wires to the wiring diagram. Label everything! A few examples are shown in Fig 3. Wire numbers are only there for identification not to dictate a hierarchy. All wires/functions are documented herein. The more useful ones are covered earlier. Hint: most are optional, for example reverse.

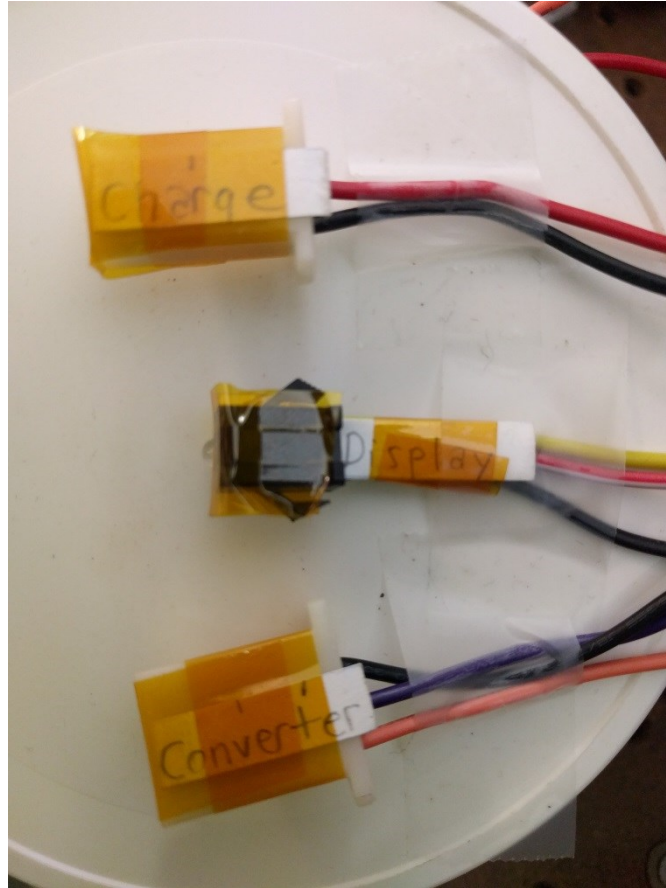


Figure 3 Label all connectors before starting.

SECURE motor, controller and throttle to a piece of wood ensuring nothing can move or vibrate during testing because Murphy's Law and Mother Nature are ever present and can be harsh.

### POWER (# color of each wire)

1 black - = GND

2 red + = power supply positive

With only the power leads connected to a 48 volt supply ensure voltage levels are nominal on the motor, hall sensor, throttle leads and E-Lock.

### MOTOR PHASE

Make sure to match colors when plugging in these wires.

3 U = yellow

4 V = green

5 W = blue

### HALL

Make sure to match colors when plugging things in.

6 red = 4.4 volts

7 black = GND

8 yellow = sensor

9 green = sensor

10 blue = sensor

## E-LOCK

Check wire colors and voltages.

11 orange = VCC

12 red + = active HIGH

Test this function through a fuse. Remember, all voltage(s) wire(s) are floating until E-LOCK is active.

## THROTTLE

23 brown = 4.3 volts

24 black = GND

25 white SD = varies with throttle position

Full throttle testing uses approximately 200 Watts when the motor is cold; RPM information given later.

## REVERSE

Check wire colors and voltages.

28 brown DC = 5 volts

29 black = GND

Full throttle reverse only uses 25 Watts and appears to be "speed limited."

### SPEED LIMITER

30, grey, XS = 5 volts

31 black = GND.

Once connected, full throttle uses only 100 Watts or half of full power. Reverse remains 25 Watts.

### CRUISE CONTROL

26 blue Q = 5 volts

27 black = GND

Cruise only works in forward. To engage, get up to speed (30 Watts when bench testing a warm motor) and momentarily connect 26 & 27. Cancel cruise using one of three methods: one, again momentarily connect the wires; two, rev the throttle; three, apply the brakes – covered in detail later. Speed limiter and multi-speeds (covered later) do not affect cruise. In my opinion, brake lights or regenerative braking are more valuable and desirable.

## 2 SPEED

32 yellow = 5 volts, **slow** speed

33 black = GND

34 blue = 5 volts, **medium** speed

Ignore warning label saying, "Don't use it." Be curious! Take chances, make mistakes and get messy. Default wiring is "fastest", so only connect these wires if you want to go slower. Reverse and cruise are not affected.

Speed	Limiter	Watts	RPM
Slow	ON	40 ± 5	1540
Med	ON	62 ± 5	2210
Slow	OFF	84 ± 5	2825
Fast	ON	95 ± 5	3150
Med	OFF	120 ± 10	3900
Fast	OFF	186 ± 20	5829*

Watts change with motor temperature. Temperature does not appear to affect RPM. 5829 RPM is calculated based on the equation  $29.336 * \text{Watts} + 372.24 = \text{RPM}$

## 2.8-9 with CHINESE CHARACTERS "BRAKE SENSE"

16 purple = Not Connected

18 yellow = Not Connected

17 green SL = 5 volts

19 black = GND.

As written, green is a brake sense cable. Connecting 17 green to 19 black halts motor power.



## DISPLAY

13 yellow = Not Connected

14 red = 5 volts when E-LOCK active

15 black = GND

Apparently this is signal to an hour meter. Consider it signal only *not* power.

## CONVERTER

20 black = GND

21 purple = Not Connected

22 orange = VCC

When E-LOCK is active converter outputs VCC. Seller, supplier, buyer must purchase separate voltage regulator, responded, said. I pulled 0.25 Watts continuously but dared no higher. Since no specs are provided, I recommend avoiding this connector.

## CHARGE

35 red = charge positive

36 black = GND

No specs were given beyond "A charger can be connected to these wires." To test, I ran the controller with a battery then connected a charger. Whereas, many controllers cut motor power whenever a charger is connected – a nice safety feature – here the motor kept spinning; fail! I recommend avoiding this connector because honest charging offline with higher gauge wire is faster and better.

## CHINESE CHARACTERS in the last row ("Protect" is a rough translation)

37 red = charge positive

38 black = GND

Feedback from the seller is, "This can be used as an alternate charging wire." I can confirm voltage levels track the CHARGE connector, they go from float to VCC once E-lock is active, however, it is an odd addition. Perhaps it is for regenerative charging or a type of resistance load protective circuit. Ultimately, this plug's function is unclear and bench testing remains inconclusive. I recommend avoiding this connector as well.

Thus ends the tour, comprehensive wiring guide and bench test review. All 38 wires are documented. There are far more details here than in video tutorials posted everywhere. Please comment if you have additional insight or find deficiencies.

Future work includes: measuring stall amperage/torque and full-load variable speed testing. If you have data or know a link please share so the world is a little more informed and better.

Send feedback if you did or did not like reading this short paper.

Enjoy!