DC brushless motor governor

ZM-BL4810K Use and Operation Instructions Manual V1.2

1, The main characteristics:

- it can the speed or set the governor parameters;
- current and speed double closed-loop design, low-speed torque is large, smooth opera
- high torque, high speed output, a maximum speed of 9999rpm / min;
- speed regulation mode: 0-5V simulation quantity and 90~110Hz PWM speed adjustme
- it has EN (enabling), DIR (direction), X1 (brake) and other signal inputs;
- it can output speed measurement pulse FG (photoelectric isolation, gate output) and ALM alarm output;
- it has the over-current, over/under pressure, overheating, blocking and other protection functions;
- it has Hall-free compatible

2. Product overview:

ZM-BL4810K DC brushless motor governor is the latest launch of our company, for the high-tech products in the field of low-power brushless motor transmission.This product uses a large-scale integrated circuit to replace the original hardware design, with higher interference resistance and rapid response ability.This product is suitable for any three-phase DC brushless motor with low-voltage within D C 18 V to 50 V (typical application DC24V, 36V, 48V), and has the characteristics of low temperature during high current operation.The products are used in knitting equipment, medical equipment, food packaging machinery, electric tools and a range of electrical automation control fields.

3.Overview of functions

This product can achieve the following functions: (Standard factory default is set to square wave with Hall ring mode)

1. The square wave has a Hall velocity open loop running
2. Square wave has a Hall speed closed-loop operation
3. Square wave runs without a Hall velocity open loop
4. Square-wave without Hall velocity closed-loop operation
5. Constant torque open-loop mode operation
6. Constant torque in closed-loop mode operation

The above functions can set them independently on the panel.

Note: No directional control function without Hall running.

4. Electrical performance indicator

Electrical performance (at ambient temperature Tj=25□)

Power Supply Voltage	DC18V~50V DC power supply (Capacity is selected according to the motor power)
Rated current	No more than 10A (Depending on the fitted motor and the rated load)
Rated Power	Max. 480W (48V voltage)
Adaptive motor	Adapt to the motor with an output power of 300W
Insulation resistance	At 500MΩ at room temperature
Insulation strength	0.5KV for 1 min normal temperature

Use the environment parameters:

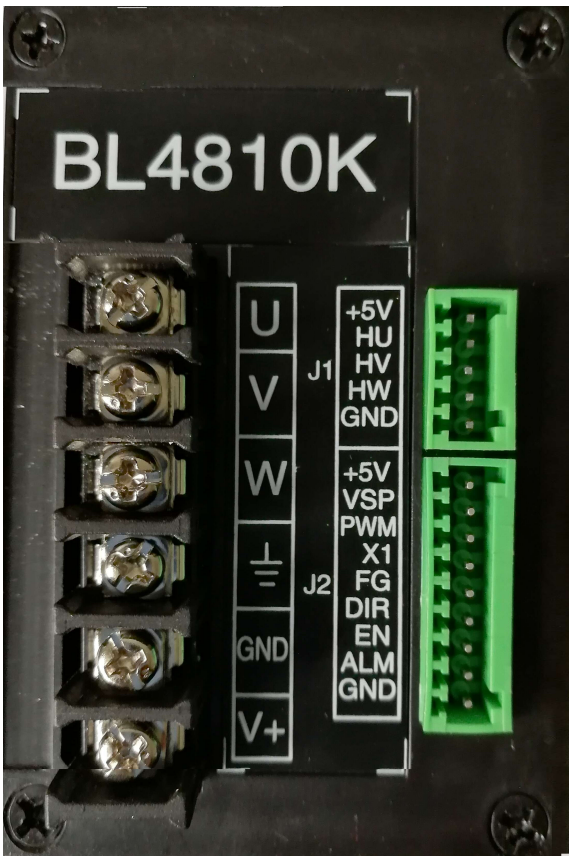
Cooling-down method		Natural air cooling (recommended)
Environmental conditions	Situation	Try to avoid dust, oil gas and corrosive gases
	Temperature	0□～+50□
	Humidity	< 80%RH, no condensation, frost free
	Vibration	< 0.5G（4.9m/s^2 ）10Hz-60Hz (Noncontinuous operation)
保存温度		-20□～+65□
外形尺寸		165×59×100mm
重量		≈ 0.4Kg

[Note] Due to the drastic changes in the temperature of the storage and transportation environment, it is easy to produce condensation or frost. At this time, the governor should be placed for more than 12 hours, before the temperature of the governor is consistent with the ambient temperature.

五、前面板说明

Function	Characteristic	Instruction
指示灯	POWER	Green power indicator, the power is normal
	ALM	Red fault indicator, often on for fault or offline
	RUN	Operation status indicator lamp, motor stop turn slow flash, motor rotation, brake flash
	EN	Enabling signal indicator lamp, EN is low level often bright, EN is high level when extinguished

6.Description of the rear panel port



Function	Characteristic	Instruction
Control signal port	+5V	Control signal power supply is positive (built-in power supply output)
	VSP	External speed control signal Control mode: change the VSP terminal voltage through the external potentiometer to achieve a speed adjustment of 0 to 100%, with a range of 0 to 5 V
	PWM	PWM speed adjustment: connect PWM signal positive to PWM and negative to GND, and change the PWM duty cycle by setting the PWM signal from 90 to 110 H z to realize speed adjustment
	X1	Motor brake control, X1 is not connected or connected + 5V motor turns normally, X1 is connected to GND, motor brake stop
	FG	The motor speed pulse output can be converted to the actual rotational speed of the motor by measuring the frequency of this signal
	DIR	The motor is positive and reverse control, DIR is not connected or the + 5V motor is turning, DIR is connected to the GND motor is reverse, positive and reverse switch, in order to reduce the impact, it is best to put EN high first to make the motor stop working
	EN	Motor start-stop control, EN connected to GND, motor turned (online state), EN not connected or high level, motor not turned (offline state, this state ALM red light is always bright)
	ALM	The alarm output, ALM output high level 3V when the governor is working normally, and ALM output 0V low leve
	GND	Control the signal power supply ground

7.Function description

Hall signal port	+5V	Hall power supply +
	HU	Hall sensor signal U input
	HV	Hall sensor signal V input
	HW	Hall sensor signal W input
	GND	Hall power supply -
Motor and power supply port	U、V、W	Motor three-phase output signal, connect to the motor winding
	GND、V+	DC D C 18 V ~ 50 V power supply input.(Typical applications of 36V, 48V)

Selection of external speed adjustment mode (VSP, PWM)	1、VSP speed adjustment: the two fixed ends of the external potentiometer (5K~10K) are connected to the GND and + 5V terminals of the governor, the adjustment end to the VSP speed adjustment, can also input the analog voltage to the V S P through other control units (such as PLC (relative to G N D), VSP port is DC 0V~ + 5V, corresponding motor speed of 0 to rated speed;
	2、PWM speed adjustment: PWM signal is positively connected to PWM and negative to GND to change the PWM duty cycle at the frequency of 90 to 110 H z to realize speed adjustment.Note: The FM priority is PWM, VSP, and panel governor from high to low!
Speed measurement signal output (FG)	The governor provides a motor speed measurement pulse signal proportional to the motor speed, and the pulse output is an open circuit output of the pull-up resistance 10K collector. Speed calculation method: motor rotation speed（RPM）= F÷N×60 F = The frequency on the FG foot was actually measured using the frequency table N = Motor pole logarithm（2poles motor N=2；4poles motor N=4） For example, the user chooses 4 pairs of pole motors, when the output FG signal = 200Hz, the motor speed =200460=3000 rpm.
Motor positive / reverse signal (DIR)	The positive reversal of the motor is controlled by controlling the conversion of high and low levels of the terminal DIR. Note: In order to avoid a sudden impact on the motor at high speed, the motor and mechanical equipment, when the DIR terminal receives the change signal, the governor will slow down until after stopping, the motor changes the steering and speed up to the set speed.
Motor start / stop signal (EN)	The stop and operation of the motor can be controlled by controlling the conversion of the high and low levels of the terminal EN.When EN is low, the motor is running normally; when EN is high or disconnected, the motor stops working and is in free state, ALM red light is always bright.The governor power consumes 20mA. Factory setting is set to EN and GND short connection.

8.Use and operation instructions

1、Enabling of the governor: press the switch on the panel, the governor of the four digital tubes lit, the current digital tube display speed, ranging from 0 to 9999 rpm.When the governor-connected brushless motor is rotating, the real-time speed of the motor is displayed on the panel.

Disactivation of the governor: turn the switch off, the digital pipe off, and the governor off; can also be used for the action of emergency motor in motor operation state.

2、Speed adjustment: the rotary speed adjustment potentiometer can realize motor speed adjustment, increasing clockwise speed and decreasing counterclockwise speed.

3、Parameter setting:

3.1 Enter the setting state

3.1.1 The governor is enabled.

3.1.2 The parameters can be set if the PWM signal has no input, the VSP signal has no input, and the front panel governor potentiometer rotates to 0 position, that is, the motor must be stopped and the ALM fault lamp is off.

3.1.3 Press the panel key MODE SET to enter the setting state (press the panel key MODE SET while the motor runs to switch between the current speed display or the current display.Current is shown in mA, such as the current governor current is 0.6A, and the digital tube is shown as 600).

3.2 set up parameters

3.2.1 After entering the setting state, the first digit of the four digital tubes displays the code for the current parameter setting, and this code flashes, when the latter three digital tubes go out.

The total of 8 set state codes corresponding are as follows:

A	C	E	F	H	L	P	U	-
speed set up	current set up	Constant torque set up	Speed increase time	With Hall / No Hall	Open ring / closed loop	Square wave / positive string	number of motor poles	Restore the factory value

3.2.2 Set the different parameters by using the keys ▲ ▼ to adjust the different setting states.

3.2.3 Adjust the value of the parameter by the key ◀ ▶, press a key value ▶ to increase one, press a key value ◀ to reduce one, the long press will accelerate the increase or decrease value.

3.2.4 When the setting is completed,press Enter to confirm the setting, then the parameter code stops flashing and displays the final result of the current setting.

3.2.5 Press ESC to exit the parameter setting state, and the digital tube enters the display current speed state.

After leaving the set state, the potentiometer on the panel can be rotated clockwise to achieve the speed adjustment of the motor, which operates in the previously set state.

3.3 Parameter declaration

A Speed Settings:The keys ◀ ▶ adjust the parameters to be set, and the value displayed  multiplied by 10 is the set speed.

Note: 1. In the constant rotation speed mode, the set rotation speed must be less than the maximum rotation speed of the motor to reach the set rotation speed.Because the governor fits for the motors with different customers and different speeds, the range is not limited to the value set by the user on the governor.

2. In order to adapt to the use of most users, the speed setting value should be greater than or equal to 100, otherwise the motor can not run at full speed.

C Current Settings：press ◀ ▶ set the current parameter value of the governor with a maximum range of 1 to 10 A.

Note: For different models of the brushless governor, the current value shall be set within the maximum current value of the brushless governor rated by the corresponding model.

E Constant torque mode settings:

press ◀,and show  protection mode for overcurrent;

press ▶, and show  is constant torque mode.

Note: The factory default is set to overcurrent protection mode.

F Motor startup acceleration time setting:

Press ◀ ▶ to set the motor start acceleration time with a maximum range of 1 to 5 in seconds

H： with Hall / no Hall settings

press ◀ is for hall drive,and show 

press ▶ is without hall drive,and show 

Note All governors are factory default to Hall drive.

L Setting of the open-loop / closed-loop control mode:

Press ◀ is Open-loop control mode for operation and show LoFF

Press ▶ is Closed-loop control mode of operation and show L oN

Note: All regulators are set by default to open ring mode.

P Square wave / sine wave drive mode setting：

The ZM-BL4810K governor lacks this feature and cannot be set up.

U Motor pole log setting ：

press ◀ ▶ and show U Set the motor pole log, can set the value of 1~8, the unit of pole log.

Note: The factory default is set to 4 paired poles.

- Factory data reset；restore factory setting：

show - oFF and flashing，press Enter Setup was successful，shows - ALL

Note: The factory is set to run with a Hall ring in the square wave.

Special description: when the setting is completed, press Enter to determine the setting, the digital pipe display shows No, it may be a communication failure, the setting is not successful.

3.4 Fault code shows:

When the regulator fails, the ALM red light on the governor is always on, and the words appear on the display shows Err

The specific fault code is:

Err 1 Hall fault (reason: Hall line not plugged into drive, or Hall element bad)

Err 2 Low voltage fault (reason: the current governor input voltage is too low)

Err 3 Overpressure fault (reason: too high current governor input voltage)

Err 4 Overcurrent fault (reason: excessive current governor output current)

Err 5 Shutdown fault (reason: output motor blocking or motor line open circuit)

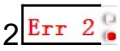
Err 6 Short-circuit fault (reason: short-circuit of motor phase line)

Err 8 Enabling failure (cause: governor enabling signal failure)

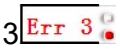
3.5 Troubleshooting the governor：

3.5.1 

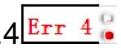
Hall fault: Check whether the Hall line is fastened; whether the Hall line phase order is wrong; whether the 5V power supply of the Hall line is correct.

3.5.2 

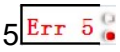
Low voltage fault: Check whether the power supply input voltage is less thanthe current governor minimum operating voltage.

3.5.3 

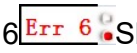
Overvoltage fault: Check whether the power supply input voltage is greater than the current governor maximum operating voltage.

3.5.4 

Overcurrent fault: Check whether the output current is greater than the current governor maximum output current.

3.5.5 

Blocking fault: Check whether the load is too large or whether the motor output line is open circuit.

3.5.6 

Short circuit fault: Check for a short circuit between the motor phase lines

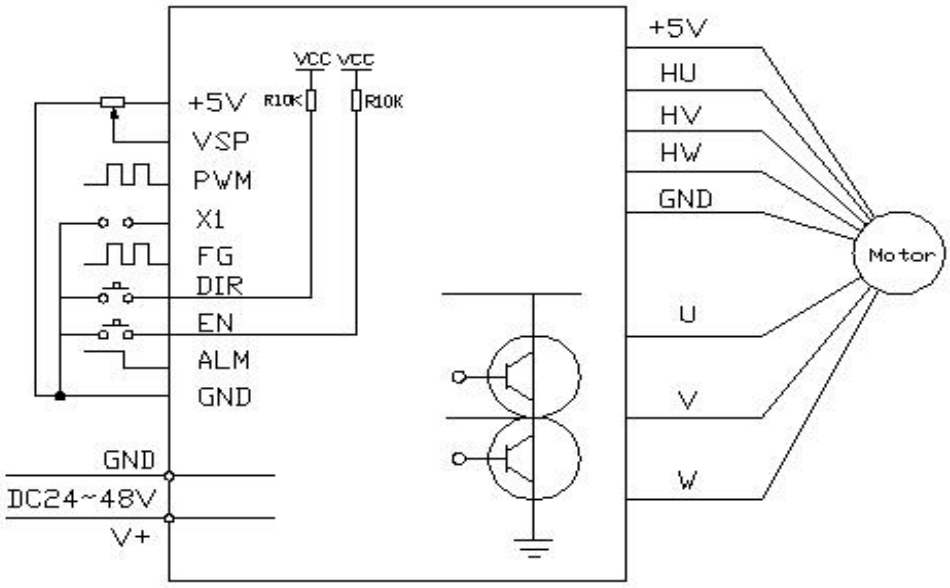
3.5.7 

Enabling fault: Check whether the governor enabling terminal is not short-connected (low level), or whether the connection line is virtual.

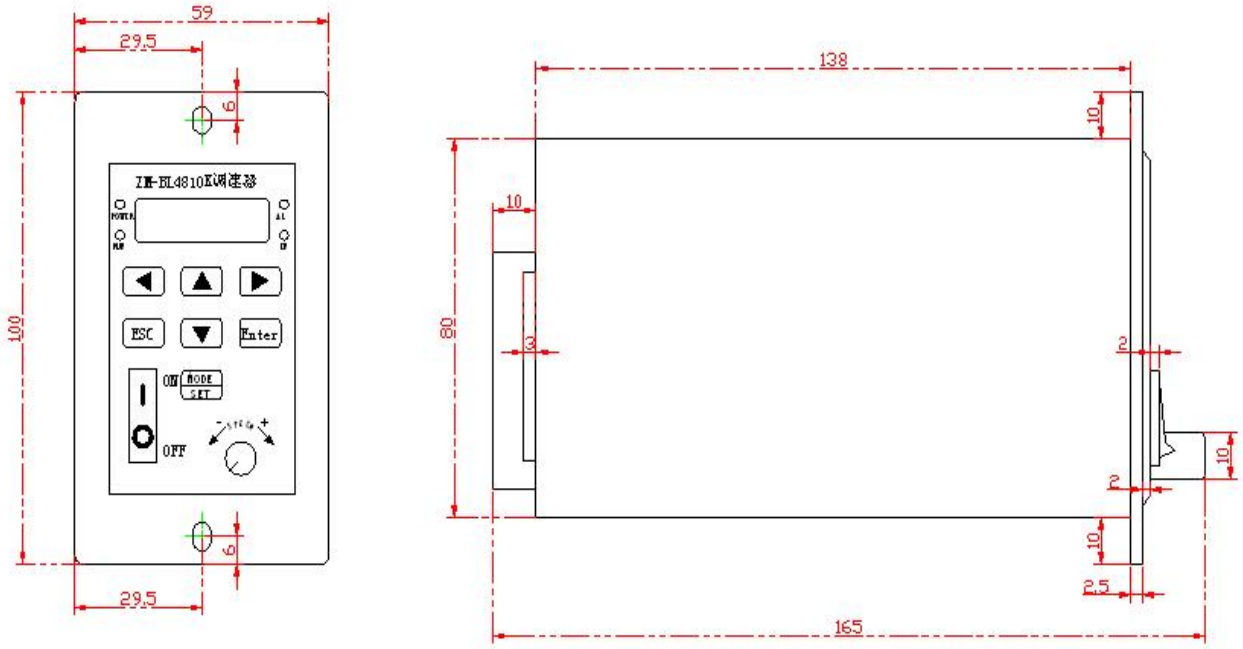
Note: 1. The above 3.5.1~3.5.6 Fault, the governor must be reagain after the fault to function normally.

2.3.5.7 Fault, the governor can resume operation online as long as the terminal connection is normal.The fault display code automatically disappears when the motor runs again, after all the governor has failed.

9.Connection diagram



1.Appearance and size（Unit：mm）



Safety matters

★ motor and governor wiring shall be powered off, do not live wiring.
★ correctly connects the power cord, motor winding line and Hall signal line according to the drawing method, noting that the order of UVW three-phase must be consistent
★ Do not arbitrarily remove the governor to prevent device damage
★ All terminals are not strictly touched during power-on operation
★ prevents the governor from running without an enclosure
★ hitting the governor may cause damage

FAQ

1. How can the first use of the governor be started as soon as possible?

   After correctly connecting the power cord, motor line and Hall line, the external potentiometer accelerates slowly. After the motor rotates correctly, the energy and direction functions are tested in turn.If the product is not familiar with it, it should be tested after the first use, and then installed to the actual occasion.

2. What is the impact of the power supply connection?

The governor burns down immediately.

3. What is the highest upper control signal voltage?

The maximum voltage of the governor signal is 5V, exceeding which causes the governor signal interface to burn down.

4. Is the case quite hot after the governor works for a long time?

Normally, at room temperature, a long working housing of 90 degrees will not affect performance.

5. What is the power indicator on, but the motor does not turn and shake. What is the reason?

There may be a wrong phase line and Hall line, please reconnect the test correctly and follow the motor instructions.

6. Can I use this governor to adjust my motor speed to 6000?

The maximum speed of the brushless motor is determined by the parameters of the motor itself, and the governor can control the motor speed at 0 to maximum speed.

7. I already have a motor in my hand. How to connect it after buying this governor?

   The phase line and Hall line definition of the motor on the hand must be determined before the wiring. If uncertain, ask the motor factory.Incorrect wiring causes the governor to cause damage.

8. Do you want to add some functions to this governor or do new product development?

Yes, please contact our company.

常州泽明自动化设备有限公司

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