DC Vibration Motor
Speed Display Controller

User Manual
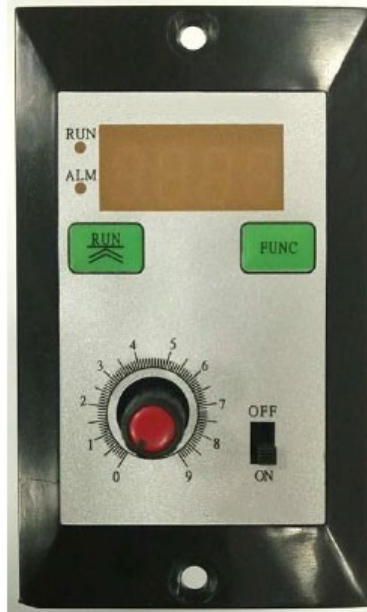
1. Controller Appearance

Fig. 1

2. General Introduction

Digital speed display controller of DC brushless motor, is commonly used for 24V, 36V, 48V voltage, ranging from 20V to 50V, and in this range, the motor can work normally. With no Hall position detection mode, it has potentiometer speed control, switch on/off, speed output, alarm output, forward and reverse function, etc., and it can display the motor speed in real time, with a protective casing.

● Start stop
● Potentiometer speed regulation
● Coast to stop
● Under voltage protection
● Current limiting
● Overcurrent protection
● Stall protection
● Alarm signal output
● Speed signal output
● No Hall position detection
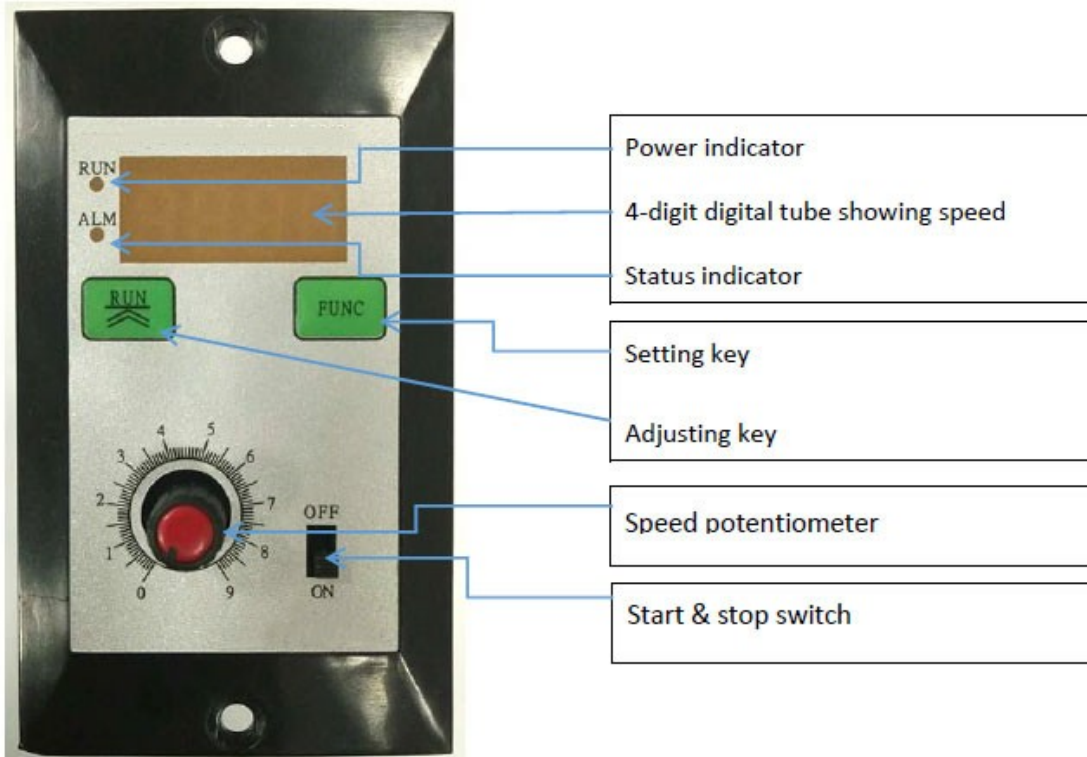
3. Controller Parameters

Items	Specifications
Rated Voltage	20-50V DC
Rated Current	10A Remark: Due to the large fluctuation of the vibration motor current, when the working current is 10A on average, the actual maximum current will exceed 10A. For the vibration motor, the average current should not be large, and 8A is suitable.
Current limit	Approx. 12A Remark: Current limiting is to avoid burning the motor and controller with large load. Do not use it over-rated current.
Maximum speed	Support speed above 20000RPM; the specific speed depends on the motor and the load
Speed regulation	Three speed control methods: 1. Control panel potentiometer: speed regulation through this potentiometer 2. External potentiometer: adjust the speed by the potentiometer connected with the terminal seat on the back of the controller 3. External 5V speed regulation voltage: 5V speed regulation voltage connected with the terminal seat on the back of the controller Remarks: Control panel potentiometer speed control and terminal block external potentiometer or 5V voltage speed regulation cannot be used at the same time. When using control panel for speed regulation, the external potentiometer or 5V speed regulation voltage is set low; otherwise, it is similar.
Speed output	PG signal: There is a 5V speed pulse output between the port and ground. The output frequency is set to P (Hz), the pair number of motor poles is N, and the speed is F (RPM), and then the output speed frequency is: $P=F*N/60$.
Alarm output	ALM signal: an alarm pulse output between the port and ground. 1. In normal operation, the port outputs 5V high level 2. When the controller is turned on, but the speed control signal is very low and the motor does not rotate, the port signal is in low level, that is, when the EN enable button is turned on, the alarm port signal is in low level as long as the motor does not rotate. It reminders that the current status is abnormal, need to be processed. 3. In the case of under voltage, over voltage, and stall, phase loss, phase short circuit, etc., the port signal is in low level.
Forward and reverse function	F/R: Connect a switch to the corresponding position of the rear terminal block. Connect one end of the switch to the F/R port, one end is grounded. The switch is on and off, to control the direction of rotation of the motor.
Start & stop	Two ways to start and stop 1. A toggle switch on the panel

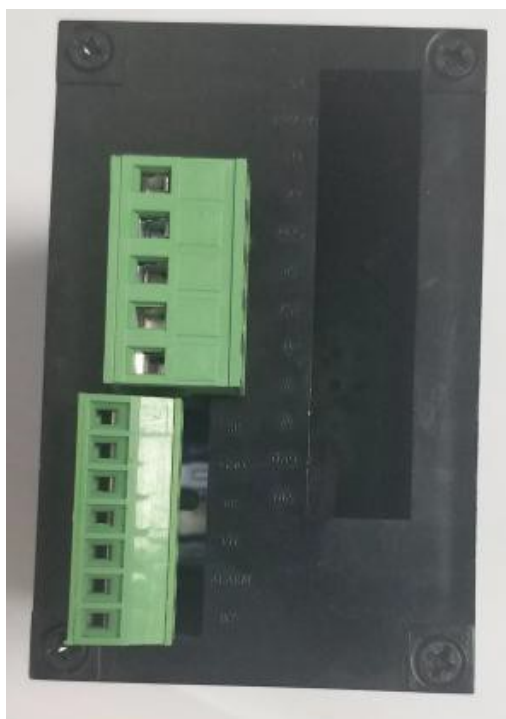|	2. Connect a switch to the corresponding position of the rear terminal block for start and stop control. Note: The two methods cannot be used at the same time. When using one method, the switch of the other way is to be in the open position.
Stall protection	When the motor is blocked and stops working, re-power and start up.
Power light	Green light: Lights up when power is on
Status light	Red light： Enable the power on, the potentiometer or the external voltage is not turned on, in the semi-standby state, the red light flashes one time at the interval. Enable power is not on, in standby state, the red light flashes seven times with the interval.
Insulation resistance	>100MΩ (Under normal temperature and pressure)
Dielectric strength	0.5KV, 1 min (Under normal temperature and pressure)

4. Working Environment

Items	Parameters	
Storage temperature	-20℃～ +65℃	
Working environment	Occasion	Avoid direct contact with dust, fumes and corrosive gases
	Temperature	0-45℃
	Humidity	＜80%，non-condensing
	Vibration	5.9m/S^2 MAX
Storage humidity	0~95%RH	
Dimension	110mm(L)*54mm*118mm（D, With terminal block, without panel switch and potentiometer）	
Weight	200g	

5. Panel Definition

	Power indicator
	4-digit digital tube showing speed
	Status indicator
	Setting key
	Adjusting key
	Speed potentiometer
	Start & stop switch

Terminals Wiring Method

The terminal block from top to bottom is defined as：

V+   Anode

GND   Ground wire

U

V

W

+5V   Anode

SV   Speed regulation

GND   Ground wire

F/R   Forward / reverse

EN   ON/OFF

ALM   Alarming

PG   Rotating speed

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6. Terminals Definition

Items	Mark	Definition & Function
Control Signal	F/R	Forward and reverse switching interface, and the other end is connected to GND
	SV	1. Speed regulation potentiometer intermediate terminal wiring position, to adjust the speed 2. External 5V positive terminal connection position, to adjust the speed
	ALM	Alarm signal interface, the other end is connected to GND
	PG	Speed signal interface, the other end is connected to GND
	EN	Switch on/off interface, the other end is connected to GND
	+5V	Control signal power 5V
	GND	Ground wire
Motor terminals	U、V、W	Correspondingly connected to the motor line. Note: Wrong connection will cause the motor to work abnormally, even damage the controller and the motor.
DC Input	V+	DC input terminal
	GND	Ground wire
Indicator Light	RUNM	Green power light: Power on, and the light is on.
Indicator Light	ALM	Red status light: in standby and semi-standby status, the LED light flashes 1 time and 7 times; in the case of stalling, phase loss or phase line short circuit and other faults, LED is always on and other flashing times.

7. **Function & Instruction**

- **Speed control mode (SV)**
  1. External potentiometer speed adjustment: connect the two fixed ends of the potentiometer to "+5V" and "GND" of the "control" terminal of the controller respectively, and connect the adjustment terminal to "SV". It is recommended that the potentiometer value be at 10K–100K.

  External power supply speed regulation: connect the negative pole of the external power supply to "GND" and the positive pole to "SV", the voltage is 5V.

- **Motor forward/reverse control (F/R)**
  Controls the direction of the motor by switching the forward and reverse switches.

- **Enable switch on/off (EN)**
  Control the braking and stopping of the motor by controlling the opening and closing of the terminals "EN" and "GND".

- **Alarm for failure (ALM)**
  The following conditions will cause the ALM output to go from a 5V high-level signal to a low level, giving a reminder for a check:
  When the enable switch is turned on, the speed regulation is not started, and the motor does not rotate; when the under voltage or over voltage occurs, or the voltage supply is abnormal; when the stall occurs, the motor phase line is short-circuited, and the phase line is out of phase, etc.

- **Motor speed signal output (PG)**
  The controller provides the customer with a pulse signal proportional to the motor speed through the terminal "PG". The pulse amplitude is 5V.
  Speed = Pulse frequency ÷ pair number of motor poles × 60 (seconds)
  For example: A 4-pole motor with a pulse signal of 50Hz, then its speed is: 50 ÷ 4 × 60 = 750 (RPM).

8. **Faults & Troubleshooting**

Faults	Causes
The motor does not rotate.	1. Check if the power supply is normal. 2. Check that the motor cable wiring is correct and firm. 3. Check if the potentiometer is wired correctly and rotated to the correct position.
Motor speed is very slow.	1. Check if the voltage is normal.
Alarm LED light is always on or flashing continuously.	In addition to the flashing of standby and semi-standby: 1. Check if the working voltage is normal.
Alarm and LED is always on.	1. Check if it is at stall. 2. Check if it is lack of phase. 3. Check if the phase line is shorted.

Note:

After the motor is well connected, try the test running first. First make the motor run at low speed, then gradually increase the speed, and then connect the load after there is no problem.

In the running process, pay attention to whether the motor is very hot. In tens of seconds to a minute or two, the temperature will rise to the situation that people feel very hot, stop the motor in time and check the cause of the problem.

The controller specification will be improved continuously. If there is something that you don't understand or is wrong, please contact us in time.