User's Manual

For

BH-ANALOG-V-6.5A Micro Stepping Driver

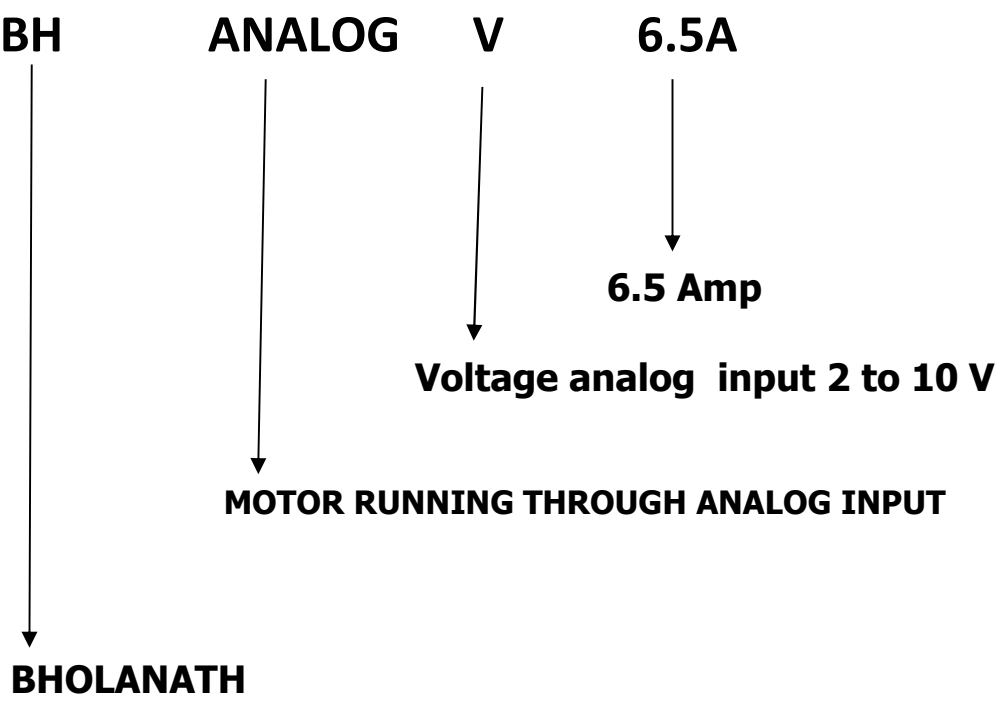
Attention: Please read this manual carefully before using the driver!

Version - 1.01

BHOLANATH PRECISION ENGINEERING PVT.LTD.

NOTE:-This driver is suitable for Nema 17,23,24 and 4 Amp models of Nema 34 stepper motors.

Product Number Code For Micro step drive



1. DC power input : 20VDC ~72VDC
2. Output current: 0.4 A-6.5A
3. Protect From:overheat, lock automatic half current, error connect protect
4. Dimension: 123mmx78mmx35mm
5. Weight:230g.
6. Working environment: Temperature: -15ºC ~ +45ºC

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1. Introduction, Features and Applications

Introduction

Analog driver is particularly suitable for the applications desired with extremely low noise and low temperature rise technology which significantly improve the performance of the stepper motor that leads to low temperature rise, low vibration. With the adjustment technology (analog I/P and current) according to different motors, the driven motors automatically generate optimal parameters for different motors, and achieve the best performance at higher speed. It is suitable for driving 2-phase and 4-phase hybrid stepping motors.

Features

- High performance, cost-effective
- Suitable for 2-phase and 4-phase motors
- Short-voltage, over-voltage, over-current and short-circuit protection
- Low temperature rise, smooth motion

Applications

Suitable for a wide range of stepping motors, from NEMA size 17 to 34. It can be used in various kinds of machines, such as X-Y tables. And a variety of large-scale automation equipments and instruments. For example: labeling machine, cutting machine, packaging machine and so on. It always performs well when applied for equipment which requires for low-vibration, low-noise, high-precision and high-velocity.

2. Specifications

Electrical Specifications

Model No:-BH-ANALOG-V-6.5A

Parameter	Min	Typical	Max	Unit
Input Voltage(DC)	20	-	72	VDC
Output current	0.4	-	6.5	A

DRIVE PREVENTION :-

NOTE:-Please ensure maximum voltage should not exeed 72 VDC to prevent damaged to the driver.

Operating Environment

Cooling	Natural cooling or Forced cooling
Operating Environment	Environment-Avoid dust, oil fog, corrosive gases Temperature- -15℃ — +45℃ Humidity Range :- up to 55RH
Storage Temperature	-15℃ — +45℃

Elimination of Heat

- Driver's reliable working temperature should be <65 ℃ , and motor working temperature should be <80℃;
- It is recommended to mount the driver vertically to maximize heat sink area. Use forced cooling method to cool the system if necessary.

3. Pin Assignment and Description

The driver has two connectors namely P1 & P2, Connector P1 for control signals connection, Connector P2 for power and motor connections. The following tables are brief descriptions of the two connectors.

Connector P1 Configurations

Pin Function	Details
PUL+	DISABLED
PUL-	DISABLED
DIR+	DISABLED
DIR-	DISABLED
ANALOG+	ANALOG INPUT POSITIVE
ANALOG-	ANALOG INPUT NEGATIVE
FAULT +	FAULT SIGNAL POSITIVE SUPPLY(EXTERNAL)
FAULT -	FAULT SIGNAL STATUS OUTPUT(EMMITER FOLLOWER)

Analog Configuration:-

Speed is Proportional to analog Input (i.e. 2-10V) This is Live zero Connection.

Analog input 2 - 5.9 V,Movement will be Clockwise,RPM:-2000 - 0

Analog input 6.1 - 10 V,Movement will be Anticlockwise,RPM:-0-2000

Median between analog input at 5.9 to 6.1 V the holding torque mode enables

Less input quantity (less than 2V) will be treated as Motor Disabled.

Connector P2 Configurations

Pin Function	Details
V+	DC POWER SUPPLY
GND	GROUND
A+,A-	MOTOR PHASE A
B+,B-	MOTOR PHASE B

VOLTAGE TO RPM

CLOCKWISE	
VOLTAGE (V)	RPM
2	2000
3	1500
4	1000
5	500
5.85	10
5.9	0

ANTICLOCKWISE	
VOLTAGE (V)	RPM
6.1	0
6.15	10
7	500
8	1000
9	1500
10	2000

Note:-Analog Voltage between 5.9 to 6.1 will be holding torque engage/zero speed

Wiring Notes

- To prevent noise incurred in Analog signal, Analog signal wires and motor wires should not be tied up together. It is better to separate them by at least 10 cm, otherwise the disturbing signals generated by motor will easily disturb analog signals, causing motor error, system instability and other failures.
- If a power supply serves several drivers, separately connecting the drivers is recommended instead of daisy-chaining.
- It is prohibited to pull and plug connector P2 while the driver is powered ON, because there is high current flowing through motor coils (even when motor is at standstill). Pulling or plugging connector P2 with power on will cause extremely high back-EMF voltage surge, which may damage the driver.

Switch Choice:

1.Current choice:

SW 1	**off**	**on**	**off**	**on**	**off**	**on**	**off**	**on**	**off**	**on**	**off**	**on**	**off**	**on**	**off**	**on**
SW 2	**off**	**off**	**on**	**on**	**off**	**off**	**on**	**on**	**off**	**off**	**on**	**on**	**off**	**off**	**on**	**on**
SW 3	**off**	**off**	**off**	**off**	**on**	**on**	**on**	**on**	**off**	**off**	**off**	**off**	**on**	**on**	**on**	**on**
SW 4	**off**	**off**	**off**	**off**	**off**	**off**	**off**	**off**	**on**	**on**	**on**	**on**	**on**	**on**	**on**	**on**
Current (A)	**0.4**	**0.6**	**0.8**	**1**	**1.3**	**1.5**	**1.7**	**2**	**2.2**	**2.8**	**3**	**4**	**5**	**5.5**	**6**	**6.5**

SW5:-OFF- Half Current, ON- Full Current.

Default setting is OFF i.e. Half Current.

Half Current :-If pulse is not given for 1 mill.sec. Current automatically gets half the set value this will reduce the heat from driver, motor and prevent it from getting damaged.It will automatically switch to full current mode when the pulse is given.

Full Current :-It is used for Holding torque operation.The Maximum time the full current should be ON to be less than 2min (approx).At full current, motor and driver temperature will rise exponentially and this will damaged the motor and driver. As a precautionary measure, After completion of holding torque operation kindly switch off the supply/Switch to HALF CURRENT mode

2.Microstepping choice:

SW 6	**off**	**on**	**off**	**on**	**off**
SW 7	**off**	**off**	**on**	**on**	**off**
SW 8	**off**	**off**	**off**	**off**	**on**
Micro	**200**	**400**	**800**	**1600**	**3200**

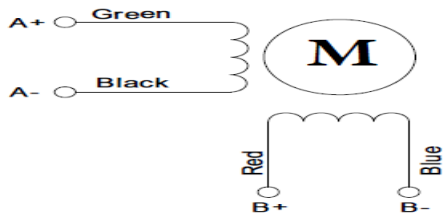
RPM & DIRECTION Control by Rotary Wheel and Switch

1. Clockwise and Anticlockwise movement of Rotary wheel will give Clockwise and Anticlockwise motion of motor.
2. To increase speed continue to rotate the wheel in same direction.
3. Once desired speed is achieved press the switch once to record the data,the motor will stop.
4. Now you can use the switch for ON-OFF as per requirement and the saved data will be used to rotate the motor.
5. Long press of 5 Sec or more will erase old data.
6. Repeat steps 1 to 4 for saving new data.

4. Connecting the Motor

Connections to 4-lead Motors

4 lead motors are the least flexible but easiest to wire. Speed and torque will depend on winding inductance.

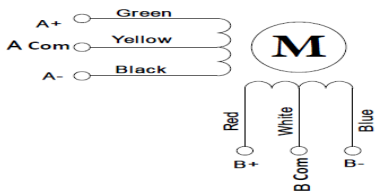


Connections to 6-lead Motors

Like 8 lead stepping motors, 6 lead motors have two configurations available for high speed or high torque operation. The higher speed configuration, or half coil, is so described because it uses one half of the motor's inductor windings. The higher torque configuration, or full coil, uses the full windings of the phases.

Half Coil Configurations

As previously stated, the half coil configuration uses 50% of the motor phase windings. This gives lower inductance, hence, lower torque output. Like the parallel connection of 8 lead motor, the torque output will be more stable at higher speeds. This configuration is also referred to as half chopper.



FOR HALF COIL CONNECTION

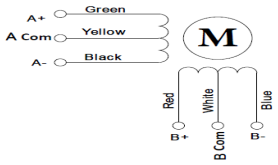
CONNECT (A+)-A Com & (B+)-B Com/

A Com-(A-) & B Com-(B-)

6-lead motor half coil (higher speed) connections

Full Coil Configurations

Lower speeds is desired. This configuration is also referred to as full chopper. In full coil mode, the motors should be run at only 70% of their rated current to prevent overheating.



FOR FULL COIL CONNECTION

CONNECT (A+)-(A-) & (B+)-(B-)/

LEAVE A Com & B Com OPEN

6-lead motor full coil (higher torque) connections

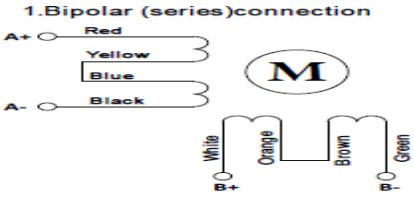
NOTE:THE ABOVE CONFIGURATIONS IS FOR CONNECTING IN A BIPOLAR MICROSTEP DRIVE AS PER APPLICATION/NON-AVAILABILITY OF A UNIPOLAR MICROSTEP DRIVE.

Connections to 8-lead Motors

8 lead motors offer a high degree of flexibility to the system designer in that they may be connected in series or parallel, thus satisfying a wide range of applications.

Series Connections

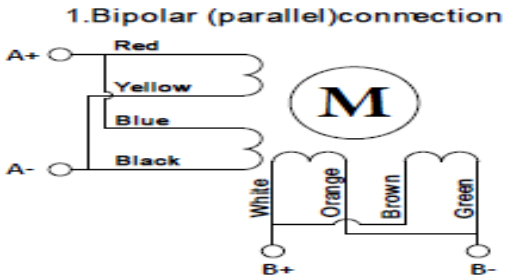
A series motor configuration would typically be used in applications where a higher torque at lower speeds is required. Because this configuration has the most inductance, the performance will start to degrade at higher speeds. In series mode, the motors should also be run at only 70% of their rated current to prevent overheating.



8-lead motor series connections

Parallel Connections

An 8 lead motor in a parallel configuration offers a more stable, but lower torque at lower speeds. But because of the lower inductance, there will be higher torque at higher speeds.



8-lead motor parallel connections

5. *Power Supply Selection*

The Analog Driver can match Large and small size stepping motors (from Nema size 17 to Nema size 34). To achieve good driving performances, it is important to select supply voltage and output current properly. Supply voltage determines the high speed performance of the motor, while output current determines the output torque of the driven motor (particularly at lower speed). Higher supply voltage will allow higher motor speed to be achieved, at the price of more noise and heating. If the motion speed requirement is low, it's better to use lower supply voltage to decrease noise, heating and improve reliability.

SMPS or Linear Power Supply

Both SMPS and Linear power supplies can be used to supply the driver. However, Linear power supplies are preferred due to their ability to withstand current surge. If SMPS power supplies (such as most switching supplies.) are indeed used, it is important to have large current output rating to avoid problems like current clamp. On the other hand, if Linear supply is used, one may use a power supply of lower current rating than that of motor (typically 50%～70% of motor current). The reason is that the driver draws current from the power supply capacitor of the Linear supply only during the ON duration, but not during the OFF duration. Therefore, the average current withdrawn from power supply is considerably less than motor current

Multiple Drivers

It is recommended to have multiple drivers to share one power supply to reduce cost, if the supply has enough capacity. To avoid cross interference, **DO NOT** daisy-chain the power supply input pins of the drivers. (Instead, please connect them to power supply separately).

6. Troubleshooting

a. The status on light's indication

RUN: green, normal work light.

ERROR: red, failure light, the motor with phase short-circuit, overvoltage and undervoltage protection.

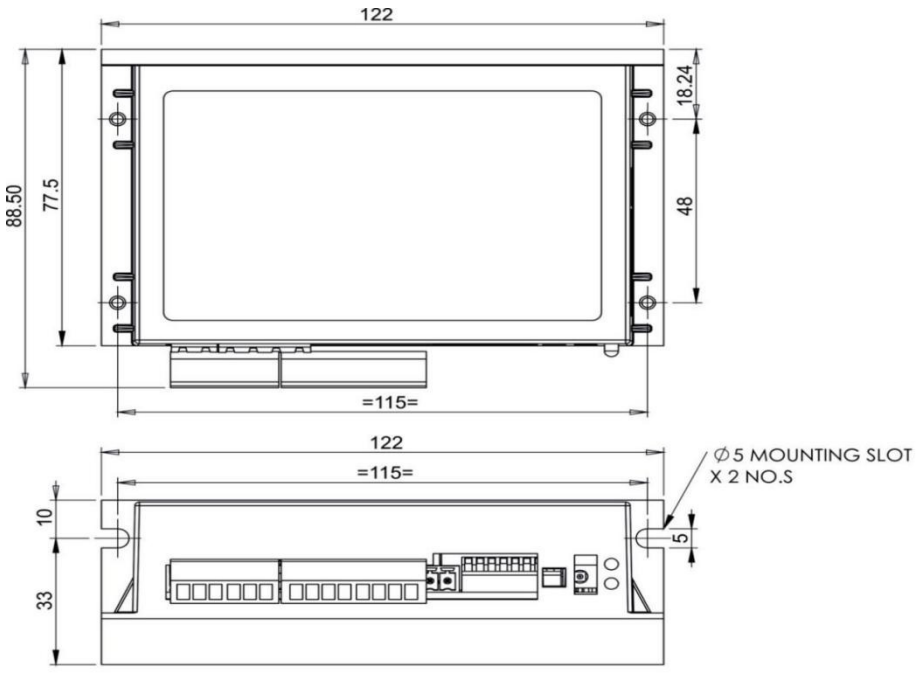
NOTE:

TO CHECK IF DRIVE IS OK/NOT OK, CONNECT ONLY SUPPLY (AC /DC) VOLTAGE AND GROUND TO THE MICROSTEP DRIVE AND CHECK THE LED INDICATOR IF IT SHOWS GREEN THEN DRIVE IS OK AND IF THE LED INDICATOR SHOWS RED THEN DRIVE IS NOT OK. THIS TEST SHOULD BE DONE WHEN THE BELOW TROUBLE SHOOTING IS CARRIED AND MOTOR IS NOT RUNNING.

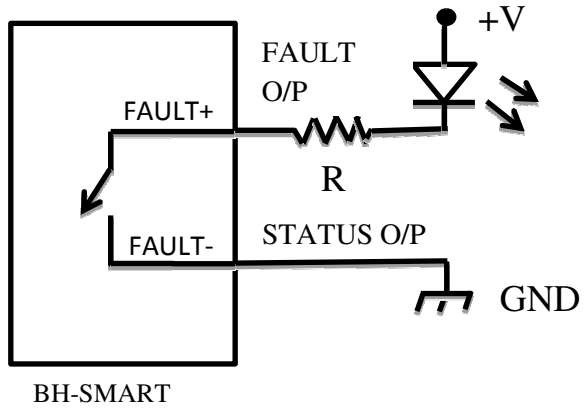
2. Troubles

Problems	Possible cause	Solutions
Motor is not rotating	No power supply	Check the power supply
	No control signal	Check the control signal
	The driver is disabled	Increase the voltage/current
RED LED light	Supply voltage is too high or too low	Check the supply voltage
	Motor line short-circuit	Check motor lines eliminate the short circuit
	Motor line wrong connect	Check the motor wiring
	Motor or drive failure	Replace the motor or drive
Motor rotates in the wrong direction	Motor phases connected in reverse	Reverse the phases line
	Motor line break	Change the phases are connected
Inaccurate Position	The motor load is too heavy.	Increasing the current
	Control signal is interfered	Eliminate interference
Motor Stalled	Power supply voltage too low	Increasing the supply voltage
	Current setting is too small	Increasing the current
	Motor torque is too small	Replace the motor

7. Dimensions

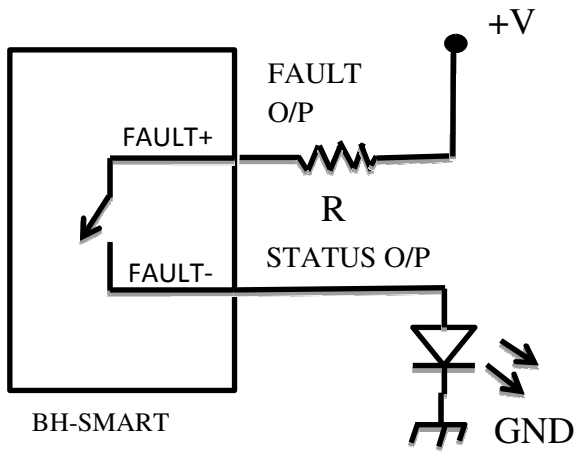


8.FAULT OUTPUT Connection



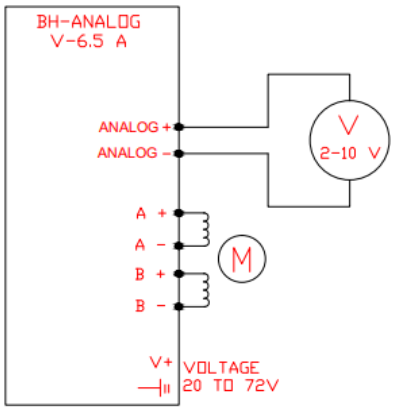
NOTE: Maximum Current through the Fault Switch Is 10 mAmp Up to 12V no external resister required

OR



9. Circuit connections Of BH-ANALOG-V-6.5A With ANALOG INPUT

BHOLANATH ANALOG VOLTAGE
INPUT DRIVE CIRCUIT
CONNECTION



10. Frequently Asked Questions

In the event that your driver doesn't operate properly, the first step is to identify whether the problem is electrical or mechanical in nature. The next step is to isolate the system component that is causing the problem. As part of this process you may have to disconnect the individual components that make up your system and verify that they operate independently. It is important to document each step in the troubleshooting process. You may need this documentation to refer back to at a later date, and these details will greatly assist our Technical Support staff in determining the problem should you need assistance.

Many of the problems that affect motion control systems can be traced to electrical noise, controller software errors, or mistake in wiring.

The content in this manual has been carefully prepared and is believed to be accurate, but no responsibility is assumed for inaccuracies

We manufacture 1.8^{o} HYBRID STEPPER MOTORS of size NEMA17, NEMA23, NEMA24, and NEMA34 in square frame and NEMA 23 in Round frame and available in our product range are Linear Actuator Stepper Motors, Planetary Geared Stepper Motors, Stepper motors with Brakes and Customized Stepper Motors.