

Stepper Motor Driver

**BCD4020FUTA3**

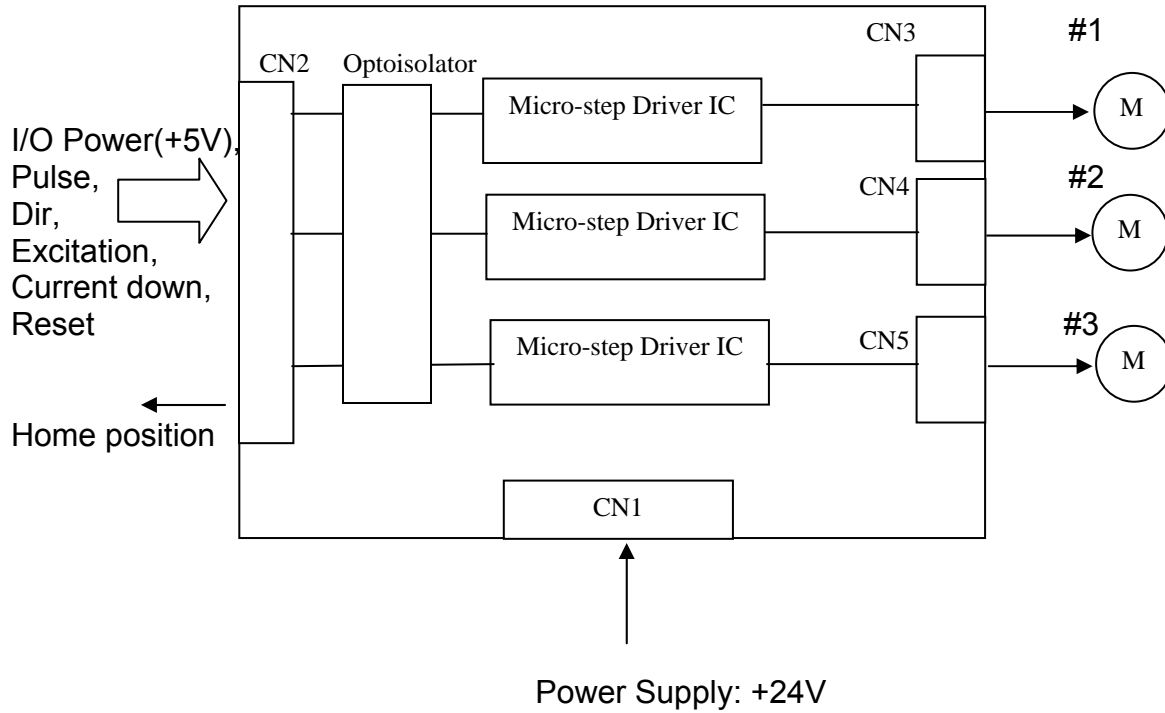
**NPM**

Nippon Pulse Motor Co., Ltd.

## 1. General

The BCD4020FUTA3 is 3 axes micro-step driver. It can control up to 3 sets of 2-phase unipolar stepper motors and perform maximum 1/8 resolution micro-stepping.

## 2. Layout



### 3. Specification

	BCD4020FUTA3
Maximum Current per Phase	2A
Power Supply	24V +/-10% Capacity: Max 12A(at 2.0A/phase) Max 9A (at 1.5A/phase) Max 6A (at 1.0A/phase)
Excitation Mode	1/1, 1/2, 1/4, 1/8
Max. Input Frequency	50KHz
Min. Input PWM	10µs (duty40 -60%)
Power Down Function	Installed
Home Position Monitor	Installed
Operation Temp.	+5 to +40°C
Storage Temp.	-10 to +70°C
Dimension (mm)	W120xD90xH38
Accessory	CN1 Connector: 5557-04R (Molex) 1pcs CN1 Pin: 5556TL (Molex) 4pcs CN2 Connector: PS-D4C36 (JAE) 1pcs CN2 Pin: PS-SF-C1-1 (JAE) 34pcs CN3 Connector: IL-6S-S3L-(N) (JAE) 3pcs CN3 Pin: IL-C2-10000 (JAE) 18pcs

### 4. Input/Output pin Function

#### 1) Connector

CN1 (Molex: 5569-04A1)

Pin#	Signal Name
1	+24V
2	+24V
3	GND
4	GND

CN3, 4, 5 (JAE: IL-6P-S3FP2)

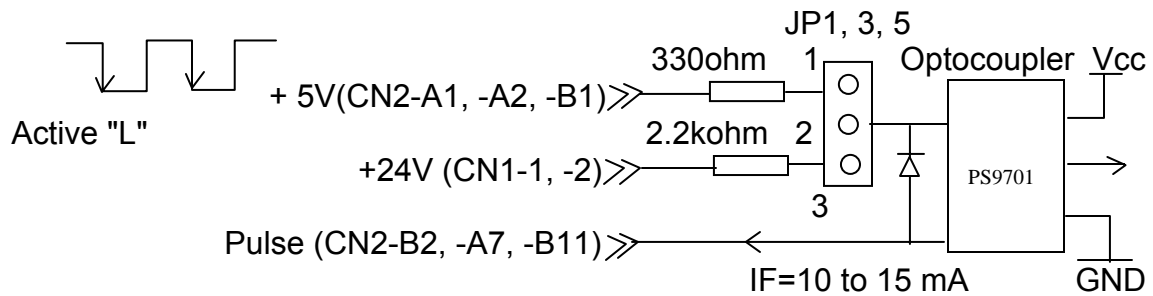
Pin#	Signal Name
1	COM
2	COM
3	A
4	A
5	B
6	B

CN2 (JAE: PS-34PE-D4LT1-LP1)

Pin#	Signal Name	Pin#	Signal Name
A1	+5v (for I/O)	B1	+5V ( for I/O)
A2	+5v (for I/O)	B2	#1 axis Pulse
A3	#1 axis Direction	B3	NC
A4	#1 axis Excitation ON/OFF	B4	#1 axis Current down
A5	#1 axis Reset	B5	NC
A6	#1 axis Home position signal	B6	NC
A7	#2 axis Pulse	B7	#2 axis Direction
A8	NC	B8	#2 Excitation ON/OFF
A9	#2 axis Current down	B9	#2 axis Reset
A10	NC	B10	#2 axis Home position signal
A11	NC	B11	#3 axis Pulse
A12	#3 axis Direction	B12	NC
A13	#3 axis Excitation ON/OFF	B13	#3 axis Current down ON/OFF
A14	#3 axis Reset	B14	NC
A15	#3 axis Home position signal	B15	NC
A16	GND(+5V)	B16	GND
A17	GND(+5V)	B17	GND

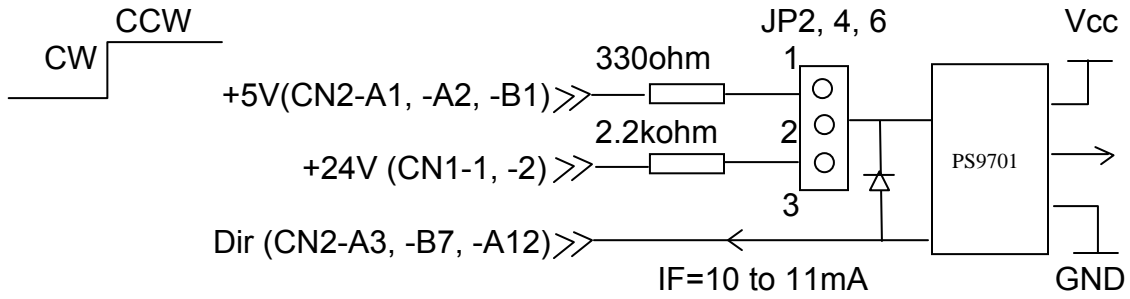
2) Input interface

Pulse:



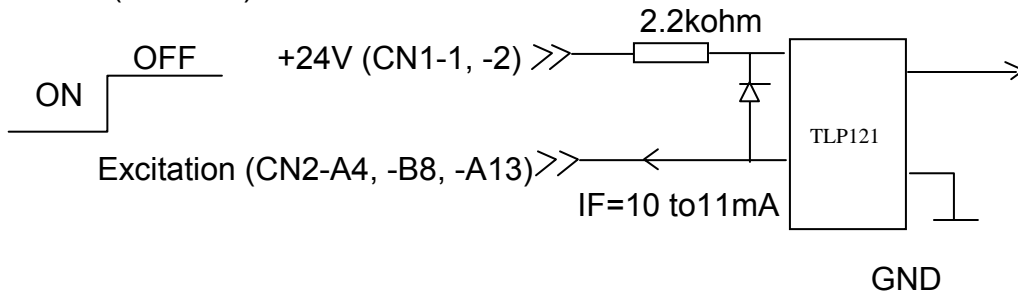
	#1 axis	#2 axis	#3 axis
JP#	JP1	JP3	JP5
CN2-#	B2	A7	B11

Direction ( $\overline{CW/CCW}$ ):

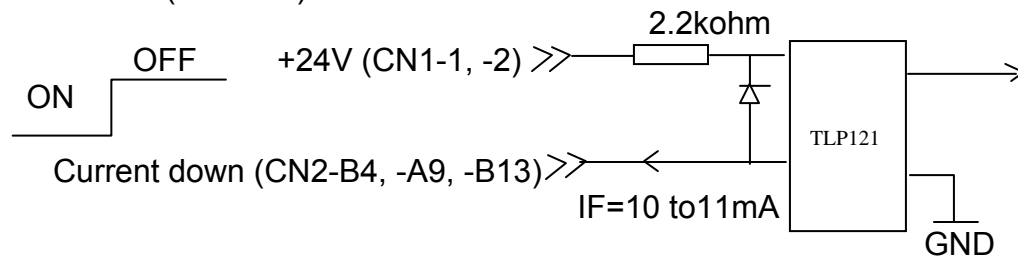


	#1 axis	#2 axis	#3 axis
JP#	JP2	JP4	JP6
CN2-#	A3	B7	A12

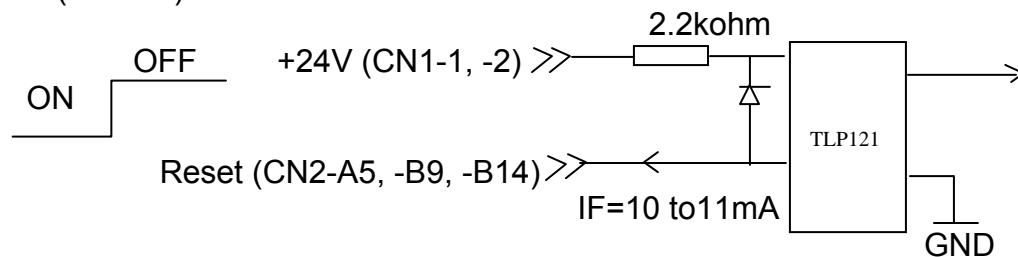
Excitation ( $\overline{ON/OFF}$ ):



Current down ( $\overline{ON/OFF}$ )



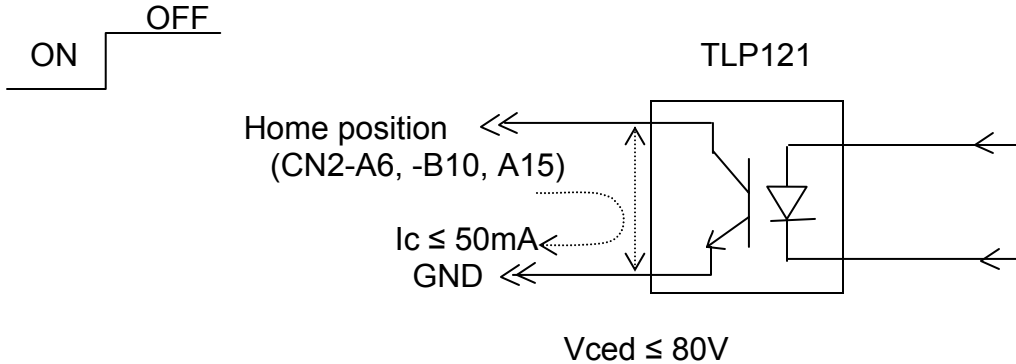
Reset (RESET)



The reset signal will initialize the whole selection (A and B phase excitation).

### 3) Output interface

Home position signal



This signal will turn on by the initial reset after the power on. The Home position signal becomes ON by the following cycle:

Excitation Mode	Cycle of "ON"
1/1	4 pulse
1/2	8 pulse
1/4	16 pulse
1/8	32 pulse

### 5. Excitation Mode (Micro-step Resolution Selection)

Excitation mode can be set for each axis individually. The selection is made by the dip-switch, DSW1-3.

DSW1: #1 axis

DSW2: #2 axis

DSW3: #3 axis

Excitation Mode	DSW1	DSW2	DSW3	DSW4
1/1	ON	ON	OFF	OFF
1/2	OFF	ON	OFF	OFF
1/4	ON	OFF	OFF	OFF
1/8	OFF	OFF	OFF	OFF

DSW4 is not used, so it can be set to either ON or OFF.

## 6. Current Adjustment

### 1) Before the adjustment

- 1) You will need a measuring device to clock the DC voltage (dc voltmeter, tester, etc).
- 2) The adjustment will be made by the trimmer (VR) after measuring the DC voltage value using the check-pin (CP).

See the "Point of CP" table below and "Layout drawing" on the final page.

	Point of CP	VR
#1 axis (CN3)	Between CP2 and CP1(GND)	VR1
#2 axis (CN4)	Between CP3 and CP1(GND)	VR2
#3 axis (CN5)	Between CP4 and CP1(GND)	VR3

- 3) The minimum current value is 0.2 A/phase.
- 4) The rated current is within 2.0 A/phase when you use this at the continuous rating. Keep the temperature of the heat sink below 90°C.

### 2) Procedure

- 1) Turn the power off (CN1).
- 2) Remove CN2, CN3, CN4, and CN5 from the board.
- 3) Connect the tester probe to the check-pin of the axis that you want to adjust. Be sure to connect the minus probe (GND) to CP1
- 4) Turn on power.
- 5) Check and adjust the DC voltage value output at CP.  
The equation of the voltage and motor current is:

$$V_{ref} (v) = I_o (A) \times 0.6$$

Example)

To set the current of #1 axis at 1.2A/phase:

\*Calculation:  $V_{ref} = 1.2 \times 0.6 = 0.72V$

\*Adjust the voltage between CP2 and CP1 at 0.72V by the VR1 trimmer.

Tuning the trimmer at CW direction increases the voltage.

- 6) After the adjustment, turn the power off again and reconnect CN2, 3, 4 and 5. Then confirm the operation of the motor by turning on the power.

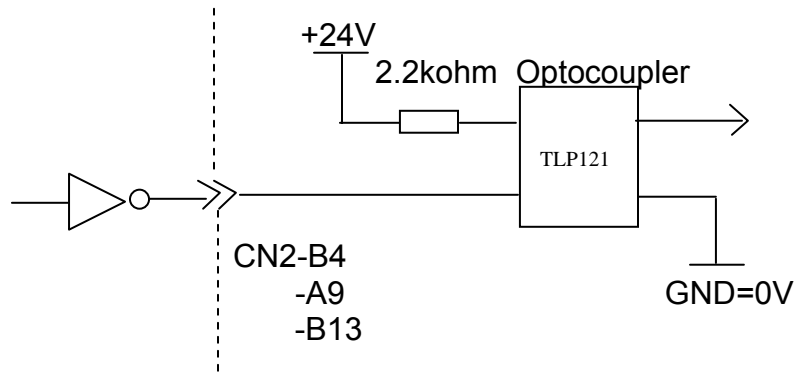
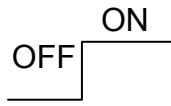
## 7. Confirmation of the value of the current down

This driver cannot adjust value itself so you need to check the value of current down.

- 1) Input the current down signal to the pin designated to each axis as follows:

Pin#	Axis	Signal Spec.
CN2-B4	#1	IF=10-11mA, Current down by optocoupler on.
CN2-A9	#2	IF=10-11mA, Current down by optocoupler on.
CN2-B13	#3	IF=10-11mA, Current down by optocoupler on.

Current down signal



2) Check the  $V_{ref}$  value and calculate the current value ( $I_{opd}$ ) by the following equation:

$$I_{opd} (A) = V_{ref} / 0.6$$