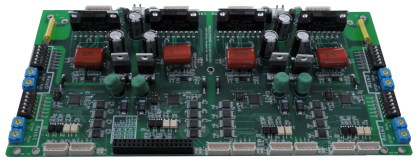
Instruction Manual

Motor driver(2P micro-step driver)

MDU2U3PDN4E



Thanks for buying the products of our EMOTIONTEK Co., Ltd.
Before use, be sure to read the safety precautions thoroughly.

● Safety precautions

※ The safety precautions is to prevent accidents or risks by using the products properly, so be sure to keep them.
※ The meaning of an 'warning' and a 'caution' is as follows:
☐Warning – When there is a possibility of serious injuries or deaths when directions are violated
☐Caution – When there is a possibility of trivial injuries or product damage when directions are violated
※ The meaning of figure symbols indicated on the product and instruction manual is as follows:
☐ is a symbol to warn that there is worry of risks under a particular condition.

☐Warning

1. When using this product for a device having a big effect on human life or property(ex: nuclear control, medical device, vehicle, railroad, aircraft, combustion device, entertainment device or safety device), be sure to attach a safety device doubly.
There may be a fire, human life accident or property loss.
2. The installation, connection, running, operation, inspection and trouble diagnosis work shall be performed by a properly qualified personnel.
There is worry of fires or electric shock injuries.
3. Use DC power supply whose primary side is heavily insulated for the power supply of this product.
There is worry of electric shocks.
4. When installing this product, establish a measure for power failure.
There is worry of injuries or equipment damage due to a motor-free condition.
5. Avoid the use of this product in the places having a risk of outdoor, explosion, inflammable gas, corrosion, water, fire or vibration.
There is worry of fires or electric shock injuries.
6. Do not put your finger or object into the product outlet.
There is worry of fires or electric shock deaths.
7. Do not dismantle or renovate this product. For internal inspections or repairs, contact our head office or branch office.
There is worry of fires, electric shocks or product damage.
8. Adjust the volume switch of the product with an insulated screw driver.
There is worry of electric shocks or product damage.

☐Caution

1. Do not move, install or connect this product while electricity is applied.
There is worry of electric shocks or product damage.
2. Be sure to keep a rated range for power input voltage, and use a power cable of AWG No18(0.75㎟) or thicker.
There is worry of fires or electric shocks.
3. Perform connection based on a connection diagram, and be sure to check whether the connection is exact before applying power.
There is worry of fires, electric shocks or product damage.
4. When connecting this product with a power source, install a circuit breaker, etc.
There is worry of fires.
5. During power failure, turn OFF the power.
There is a risk of injuries due to the sudden starting of the product while recovering the power.
6. Do not touch the product during operation and just after stop.
There is worry of burns due to a high temperature on the product surface.
7. During operation, enable an emergency stop at all times.
There is worry of equipment damage or injuries.
8. When inputting power, check the control input signal of the product and then input power.
There is worry of injuries or equipment damage due to an unexpected signal input.
9. Do not turn ON the motor-free signal if this product is used in a vertical direction.
There is worry of injuries or equipment damage due to gravitational falling-down.
10. If it needs to be maintained in a vertical direction after turning OFF the power input, install a separate safety device.
There is worry of injuries or equipment damage due to motor-free.
11. When revolving the shaft of the step motor manually, check whether the motor-free is ON.
There is a risk of injuries due to an unexpected start.
12. When an abnormality takes place, stop it urgently.
There is a risk of fires or injuries.
13. Do not touch the terminals when measuring insulation resistance or performing an insulation pressure resistance test.
There is worry of electric shocks.
14. Do not exceed the product rating and performance.
There is worry of electric shocks, injuries or equipment damage.
15. During cleaning, do not use water or organic solvents, and use a dry towel.
There is worry of electric shocks or fires.
16. When discarding this product, dispose of it as an industrial waste.
17. Use only the 2P stepping motor designated to the motor output terminals.
There is worry of equipment damage or fires.

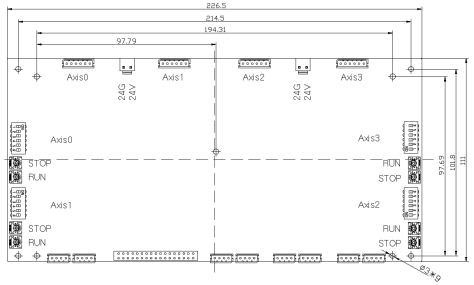
● Feature

1. 2 phase constant-current unipolar drive type
2. Precise control at low speed rotation with micro-step driving possible (resolution : 200 X 1 ~ 1200 pulses/rev)
3. Provided with run current and stop current regulation function
4. Adoption of an input/output insulation using photo couplers
5. Power input voltage : 12 ~ 36VDC

●Rating / performance (per axis)

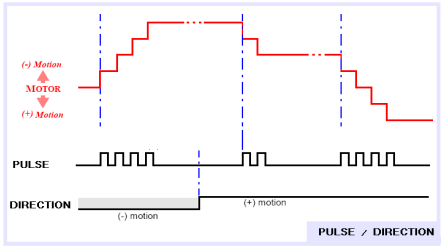
Model name	MDU2U3PN4E
Operation Type	2 Phase Constant-Current Unipolar PWM driver
Power voltage	12 ~ 36VDC
Current consumption	4A[Max]
Drive current	1 ~ 3A
Resolution	200 ~ 240000 pulses/rev
Maximum input pulse rate(1)	1MHz Max(1Mpps Max)
Impulse noise immunity	Inter-power-line pulse width 1us, pulse transition time 1ns pulse height ±1100VDC 60Hz
Operating ambient temperature	0 ~ 50℃(non-freezing)
Operating ambient humidity	35 ~85% RH(non-freezing)
Storage temperature	-20 ~ 60℃(non-freezing)

●External dimension diagram(unit: mm)

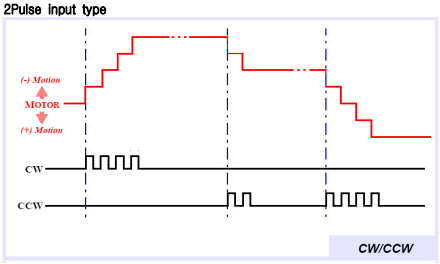


● Timing Chart

1. 1Pulse input type

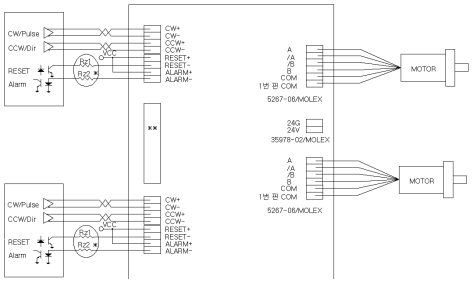


2. 2Pulse input type



●Input/output circuit and example

※ Adjust the Rz1 and Rz2 resistor value depending on the VCC value.
※※ This is a connector for interface with the MAIN board.



●Function

No	Mode	Function					
		OFF		On			
1	Type	1Pulse (Pulse /DIR)		2Pulse (CW / CCW)			
2	MS4	Resolution	Setting	Resolution	Setting	Resolution	Setting
		200	00000	400	00001	600	00010
3	MS3	800	00011	1000	00100	1200	00101
		1600	00110	2000	00111	2400	01000
4	MS2	3000	01001	3200	01010	4000	01011
		4800	01100	5000	01101	6000	01110
5	MS1	8000	01111	9600	10000	10000	10001
		12000	10010	15000	10011	16000	10100
6	MS0	20000	10101	24000	10110	30000	10111
		40000	11000	48000	11001	60000	11010
		80000	11011	120000	11100	240000	11101
		Test Run		11111(1RPS)			

*1) The resolution is composed to be set by digit number 6 ~ 2(MS0~MS4 : 5Bit) based on 200 pulses. The setting method is as follows:
Ex) setting method for 1200:1 resolution
(1200 x 200 pulses/rev = 240000 pulses/rev)
select (11101) for 240000
"1 = ON direction"
"0 = other direction"

1. 1P(1 pulse type)/2P(2 pulse type)

- Operation mode selection
- 1P type : Clock signal input in 'Pulse', and rotational direction signal input in 'Dir '
- 2P type : Forward rotation clock signal input in 'CW', and reverse rotation clock signal input in 'CCW'

2. MS0/MS1/MS2/MS3/MS4

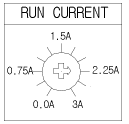
- Driver micro-step resolution select switch
- You can select X 1 ~ 1200 pulses/step depending on your choice.
- You can input clock signal at the maximum input pulse frequency up to 1Mpps.

switch numbered '2' is the most significant digit, switch numbered '6' the least significant.
2 Phase angle/pulse = 360° / resolution

3. TEST RUN(11111) setting

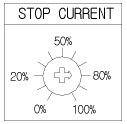
- You can set this to check the normal operation of a driver.
- This runs in 200 X 100 pulses/rev without external clock, direction signals.
- Note) Setting this with a mechanism attached is dangerous because it starts automatically after power is applied.

4. Run current setting



- The run current means an available normal current.
- It should be set within a range of 100%(3A).
- Use this below the rated current of the motor.
- Set this within the setting range, but excessive use can result in abnormal operation(severe heating, step-out phenomenon).
- Run current setting range: 0~3A

5. Stop current setting



- The stop current is a normal current supplied when the motor stops.
- This should be set within a 0~100% range of the already set run current.
- This function works during a motor stop, and doesn't work during a motor-free and start.
- Stop current setting value : 0 ~100% of run current

● Trouble diagnosis and troubleshooting

1. When the motor doesn't rotate
 - Check the connection condition and input specification(voltage rating) of the controller and driver.
 - Check whether the input pulse type is the same as the connected controller.
 - In case of an 1P input type, check whether the clock and direction signal are properly connected.
2. When the motor rotates in the reverse direction
 - In case of a 2P input type, check whether the input pulse connection in the CW and CCW side is proper.
 - In case of a 1P input type, it is forward rotation if the CW side is 'H' and reverse rotation if the CW side is 'L'.
3. When the motor rotation is unstable
 - Check if the connection between the driver and the motor is proper.
 - Check the driver pulse input specification(voltage, pulse width).
 - Check whether the output current and the current necessary for the operation of a motor are proper depending on the current adjustment switch setting.

● Cautions for handling

1. Cautions for inputting signals
 - In case of a 2Pulse input type, do not input both the CW and CCW simultaneously. There is worry of malfunctions.
2. Cautions for setting the run current and the stop current
 - There may be severe heating of the motor when the run current exceeds the rated current, so set it below the rated current.
3. Cautions during wiring
 - For signal wiring, use a twisted pair(0.2㎟ or higher) and use it within 2m length.
 - When extending the motor wiring, use a cable thicker than the standard wire.
 - Be sure to separate the signal wire apart from the power cable by more than 10cm.
4. Cautions during attachment
 - In order to enhance the cooling efficiency, attach it as closely as possible to the metal surface.
 - In order to enhance the cooling efficiency, attach it to a well-ventilated place.
5. Cautions when using a function switch
 - Changing the input signal type selection switch to a 2P input type during a 1P input type operation can reverse the motor rotation direction to cause a risk. Do not change the input signal type and resolution during motor operation.

※ The above contents specified in the cautions for handling can cause a trouble to the product, so be sure to keep them.※

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