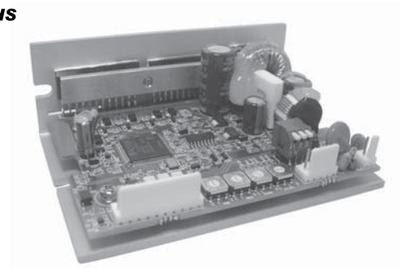
Technodrive

Motor Driver(5-Phase microstepping driver)

KR-A55ME

M A N U A L

CE RoHS



Thank you very much for selecting Technodrive products.
For your safety, please read the following before using.

▣ Caution for your safety

※Please keep these instructions and review them before using this unit.

※Please observe the cautions that follow;
⚠ **Warning** Serious injury may result if instructions are not followed.
⚠ **Caution** Product may be damaged, or injury may result if instructions are not followed.

※The following is an explanation of the symbols used in the operation manual.
⚠caution:Injury or danger may occur under special conditions.

⚠ Warning

1. **In case of using this unit with machinery(Nuclear power control, medical equipment, vehicle, train, airplane, combustion apparatus, entertainment or safety device etc), it is required to install fail-safe device, or contact us for information on type required.**
   It may cause serious human injury or a fire, property.
2. **Installation, connection, operation, control, maintenance should be carried out by person who has been qualified.**
   It may cause a fire, human injury or give an electric shock.
3. **Please use DC power with reinforced insulating the primary and secondary part for the DC power product.**
   It may give an electric shock.
4. **Please install this unit after consider countplan against power failure.**
   It may cause human injury or damage to product by releasing holding torque of motor.
5. **Do not use this unit outdoors or place where there are explosiveness, flammable, corrosive gas, water and frequent vibration etc.**
   It may cause a fire or give an electric shock.
6. **Do not disassemble or modify this unit. Please contact us if it required.**
   It may cause a fire, give an electric shock or damage to product.
7. **Please install protection equipment on board type product.**
   It may cause a fire.

⚠ Caution

1. **Power input voltage must be used within rating specification and power line should be over than AWG NO. 18(0.75mm²).**
   It may cause a fire or give an electric shock.
2. **Please check the connection before power.**
   It may cause a fire or give an electric shock.
3. **Please turn off when power failure occurred.**
   It may cause human injury or damage to product due to sudden movement by recovering from power failure.
4. **Do not touch during the operation or after a while of operation.**
   It may cause a burn due to high temperature in surface.
5. **The emergency stop should be enabled during the operation.**
   It may cause human injury or damage to product.
6. **Please apply power after checking control input signal.**
   It may cause human injury or damage to product by sudden movement.
7. **Do not turn on the HOLD OFF signal input while it is maintaining vertical position.**
   It may cause human injury or damage to product by releasing holding torque of motor.
8. **Please install a safety device when need to remain the vertical position after turn off the power.**
   It may cause human injury or damage to product by releasing holding torque of motor.
9. **Please check if HOLD OFF signal input is ON when need to set the output manually.**
   It may cause human injury by sudden movement.
10. **Please stop this unit when mechanical problem is occurred.**
    It may cause a fire or human injury.
11. **Do not touch the terminal when during the insulation dielectric strength test or insulation resistance measurement.**
    It may give an electric shock.
12. **Please observe rating specification.**
    It may cause a fire, give an electric shock or damage to product.
13. **In cleaning the unit, do not use water or an oil-based detergent.**
    It may cause a fire or give an electric shock.
14. **Please separate as industrial waste when disuse this unit.**

※ The above specifications are changeable at anytime without notice.

▣ Features

- Microstep operation for silent and low vibration of rotation.
- Wide range of step angle can be applied by switching signal.
- It can be divided up to 250 of microstep and 5-phase stepping motor with 0.72˚ of basic step is rotated as 0.00288˚ per 1 pulse and it is required to input 125,000 pulse for 1 rotation of motor.
- Includes auto current down, self-diagnosis function.
- Small, light weight and advanced quality by custom IC and surface mounted circuit.
- Photocoupler input insulation method to minimize the effects from external noise.

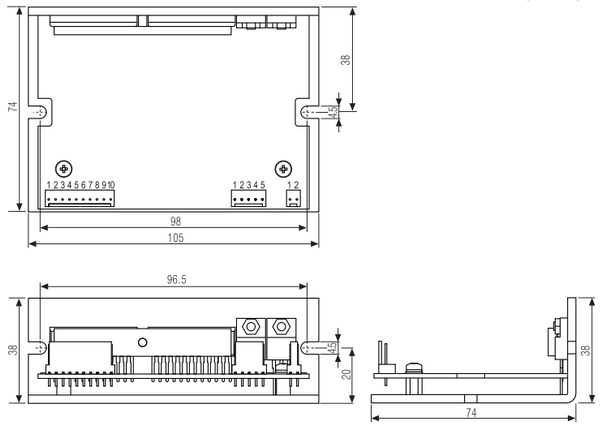
▣ Specifications

Model		KR−A55ME
Power supply		20−35VDC 3A[Max.](-10%, +20%)
RUN current		0.4~1.4A/Phase
Drive method		Bipolar constant current pentagon drive
Resolution(Rotating angle)		1, 2, 4, 5, 8, 10, 16, 20, 25, 40, 50, 80, 100, 125, 200, 250 division
CW/CCW Input pulse	Pulse width	Min. 0.25μs
	Pulse interval	Min. 0.25μs
	Rising/Falling time	Max. 1μs
	Frequency	Max. 500kpps
	Voltage	High:4−8VDC, Low:0−0.5VDC
	Current	10~20mA
Ambient temperature		0~40℃(at non-freezing status)
Ambient humidity		35~85%RH(at non-dew status)
Unit weight		Approx. 180g

※ There is torque difference by input power.

▣ Dimensions

(Unit:mm)



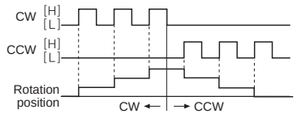
※ Accessory connector specification (manufacturer : MOLEX)

	Model	Quantity
2-pin power connector	5051-02	1
5-pin motor connector	5051-05	1
10-pin signal connector	5051-10	1
Connector pin	5159TL	17

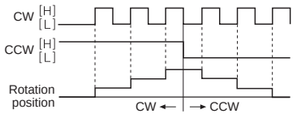
▣ Time charts

◎ CW / CCW Input(CW : Clockwise direction from the front view of shaft)

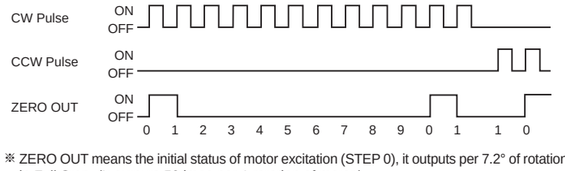
● 2 Pulse type



● 1 Pulse type

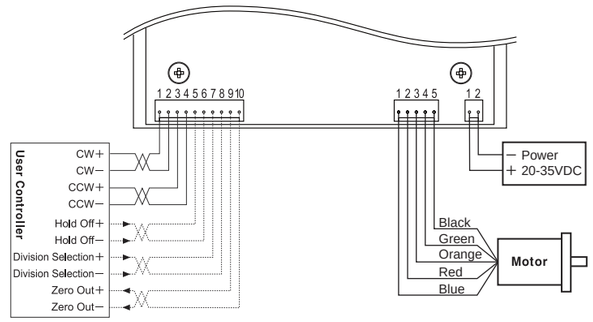


◎ ZERO OUT output



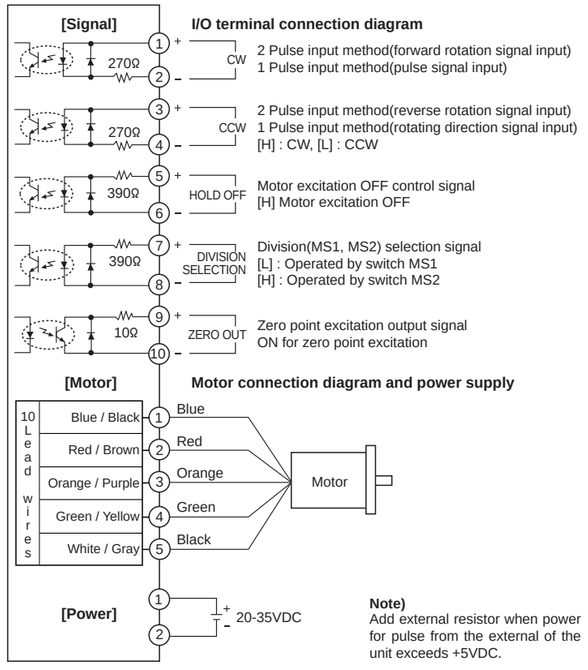
※ ZERO OUT means the initial status of motor excitation (STEP 0), it outputs per 7.2° of rotation in Full Step. (It outputs 50times per 1 rotation of motor.)
Ex) Full step : It outputs one time when input 10 pulse.
20 division : It outputs one time when input 200 pulse.

▣ Connections



▣ Input･Output diagram

＜KR−A55ME Driver inner circuit＞



▣ Function

◎ Selectable function switch

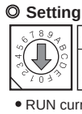
No	Name	Function	Switch position	
			ON	OFF
1	TEST	Self diagnosis function	250pps rotation	Normal
2	1/2 CLK	Pulse input method	1 Pulse input	2 Pulse input
3	C/D	Auto Current Down	No use	Use

● TEST
※ It rotates at a speed of 250pps in Full Step and it is changed depending on resolution.
※ It rotates to CCW in 1 Pulse input method and CW in 2 Pulse input method.

● 1/2 CLK
※ Pulse input method selection
※ 1 Pulse method : Input pulse signal input in CW and rotating direction signal in CCW. It rotates to CCW when [L] and CW for [H].
※ 2 Pulse method : Motor is rotated to CW when input pulse in CW and to CCW when input pulse in CCW.

● C/D(CURRENT DOWN)
※ It is to reduce RUN current according to the setting rate of STOP current switch when motor stops in order to reduce motor' s heat generation.
※ Current is reduced from approx.500[ms] after the last pulse input.

◎ Setting RUN current



Switch No	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Current (A/Phase)	0.4	0.5	0.57	0.63	0.71	0.77	0.84	0.9	0.96	1.02	1.09	1.15	1.22	1.27	1.33	1.4

- RUN current is phase current for 5 phase stepping motor.
- There can be an error in RUN current setting value by driving frequency.
- RUN current should be used within the rated current of motor, or it may cause overheating, step-out and loss of torque.

◎ Setting STOP current

Switch No	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
%	27	31	36	40	45	50	54	58	62	66	70	74	78	82	86	90

- STOP current is phase current provided to 5-phase of stepping motor to be stopped.
- The switch setting value of STOP current is a percentage of RUN current switch setting current value.
- There can be an error in STOP current by coil impedance of motor.
- This function shall be operated when CURRENT DOWN switch is set to OFF. In case CURRENT DOWN switch is set to ON, RUN CURRENT shall be provided both when a motor stops and when a motor runs.

◎ Zero point excitation output signal(ZERO OUT)
It indicates the initial step of excitation status of stepping motor and rotation position of motor axis from previously set zero.

◎ HOLD OFF function
- HOLD OFF is [H], the excitation is released, because current provided to each phase is cut off.
- HOLD OFF is [L], the excitation is in a normal status.
- It rotates motor axis by external force or is used for manual positioning.
- Input H/L means ON/OFF of photocoupler in a circuit.

◎ Setting micro step(Microstep:Resolution)

Switch No	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Resolution	1	2	4	5	8	10	16	20	25	40	50	80	100	125	200	250

● Setting resolution(Same for MS1, MS2)
※ It drives a motor dividing basic step angle(0.72°) by setting value of resolution.
※ The calculation formula of divided step angle is as below.

$$1 \text{ step angle of 5-phase stepping motor} = \frac{\text{Basic step angle}(0.72°)}{\text{Resolution}}$$

※ When resolution is changed during the operation of motor, it may cause a step-out of motor.

● Selectable resolution(Selectable Step angle)
※ Change into the resolution in MS1/MS2 by DIVISION SELECTION input.
※ Motor is rotated by resolution in MS1 when DIVISION SELECTION signal is [L] and MS2 for [H].
※ Change the resolution after motor is stopped or, it may cause a step-out of motor.
※ Input H/L means ON/OFF of photocoupler in a circuit.

▣ Caution for using

1. Caution for signal input
   ① Do not input CW, CCW signal at the same time in 2 Pulse input method. It may not work properly if another signal is supplied when one of them is ON.
   ② In case, the signal input supply is higher than rated supply expressed on the specification, please connect the additional resistor to external part.
2. Caution for supplying power
   ① Use the power enough to supply the run current when turn on the power.
   ② The current value indicated on power supply is the max. input of driver.
   ③ **Please check the polarity of power before using.**
3. Caution for wiring
   ① Use Twist pair(Over 0.2mm²) for the signal wire should be shorter than 2m.
   ② Please use an electric wire is thicker than the motor lead when product the motor wire connection.
4. Caution for installation
   ① In order to increase heat protection efficiency, keep the heat sink as close as possible to metal panel and keep it well-ventilated.
   ② Excessive heat generation may occur on Driver. Keep the heat sink under 80℃ when installing the unit.(In case it is over 80℃, forcible cooling shall be required.)
5. Caution for using function switches
   ① Check the position of self-diagnosis switch before turn on the power. It may be dangerous if turn on the power in [ON] status, due to motor is worked instantly or cause a malfunction.
   ② When the selection switch of input signal method is changed to 2 Pulse input method during the operation with 1 Pulse input method, it may be danger as the revolution way of the motor is changed conversely. Please do not change the input signal method during the operation.
6. Installation environment
   ① It shall be used indoor ③ Pollution Degree 2
   ② Altitude Max. 2000m ④ Installation Category Ⅱ

※ It may cause malfunction if above instructions are not followed.

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