

**Motor Driver(5-Phase microstepping driver)**

**KR-A535M**

**M A N U A L**



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**

- 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.
- 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.
- It should be installed and earth independently and grounding wire should be over than AWG No.18(0.75mm<sup>2</sup>). It may give an electric shock.
- 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.
- 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.
- Do not touch this unit or connection terminal of condenser within 30sec after turn off the power. It may give an electric shock by residual voltage.
- Do not put finger or any object in to this product. It may cause a fire or give an electric shock.
- 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.
- Please adjust the volume switch with insulated screw driver. It may give an electric shock.
- It should be insulated not to expose the conductor, because connecting party has a dangerous voltage when join to connector.

**Caution**

- Do not move, install or maintain during it is operating. It may give an electric shock.
- Power input voltage must be used within rating specification and power line should be over than AWG NO. 18(0.75mm<sup>2</sup>). It may cause a fire or give an electric shock.
- Please check the connection before power. It may cause a fire or give an electric shock.
- When you connect to power, please install current breaker. It may cause a fire.
- 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.
- Do not touch during the operation or after a while of operation. It may cause a burn due to high temperature in surface.
- The emergency stop should be enabled during the operation. It may cause human injury or damage to product.
- Please apply power after checking control input signal. It may cause human injury or damage to product by sudden movement.
- 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.
- 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.
- Please check if HOLD OFF signal input is ON when need to set the output manually. It may cause human injury by sudden movement.
- Please stop this unit when mechanical problem is occurred. It may cause a fire or human injury.
- Do not touch the terminal when during the insulation dielectric strength test or insulation resistance measurement. It may give an electric shock.
- Please observe rating specification. It may cause a fire, give an electric shock or damage to product.
- In cleaning the unit, do not use water or an oil-based detergent. It may cause a fire or give an electric shock.
- Please separate as industrial waste when disuse this unit.
- Use the specified 5-phase stepping motor in motor output terminal. It may cause a fire or damage to product.

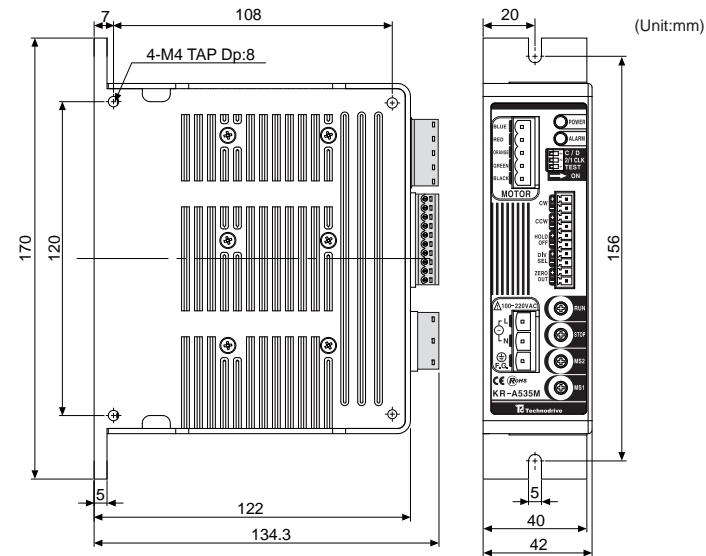
※ The above specifications are changeable at anytime without notice.

**Specification**

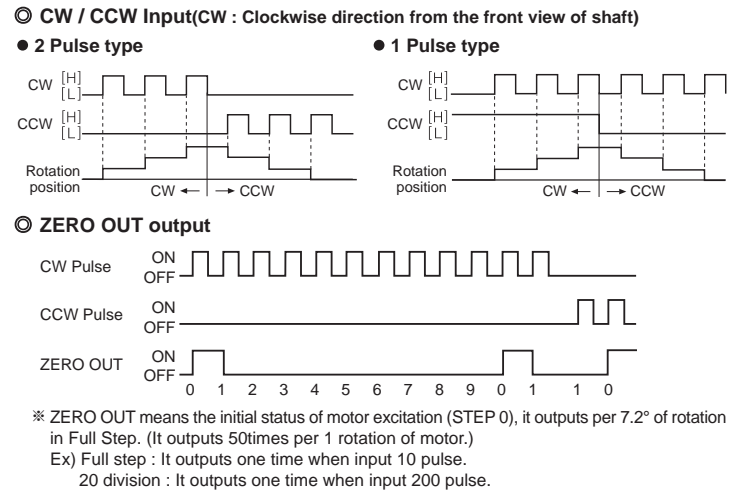
<b>Model</b>		<b>KR-A535M</b>
Power supply	100-220VAC±10% 50/60Hz	
Power consumption (1)	3A(Max.)	
RUN current (2)	0.4-1.4A/Phase	
Drive method	Bipolar constant current pentagon drive	
Resolution	1, 2, 4, 5, 8, 10, 16, 20, 25, 40, 50, 80, 100, 125, 200, 250 division	
CW/CCW	Pulse width	Min. 0.25μs(Duty max. 50%)
	Pulse interval	Min. 0.25μs(Duty max. 50%)
	Rising/falling time	Max. 1μs
	Input pulse	High: 4-8VDC, Low: 0-0.5VDC
Input pulse	Current	10-20mA
	Frequency(3)	Max. 500kpps
Ambient temperature	0-50°C(at non-freezing status)	
Ambient humidity	35-85%RH(at non-dew status)	
Unit weight	Approx. 660g	

- ※ (1) Ambient temperature is 25°C and ambient humidity is 55%RH.
- ※ (2) The max. value of RUN current is based on RMS value in accordance with frequency of running motor, peak power can be changed by load fluctuation.
- ※ (3) Variable depending on resolution and motor's load.

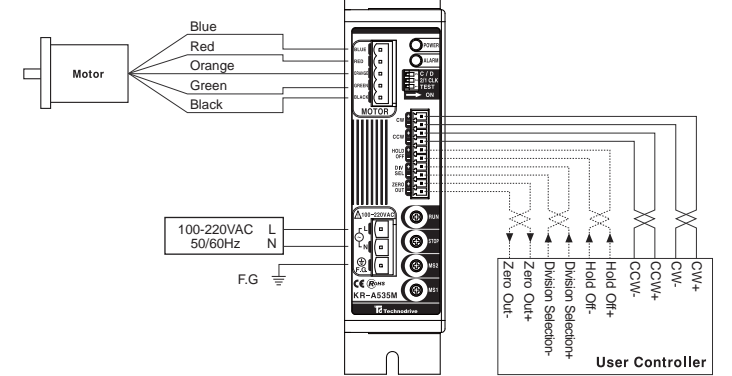
**Dimensions**



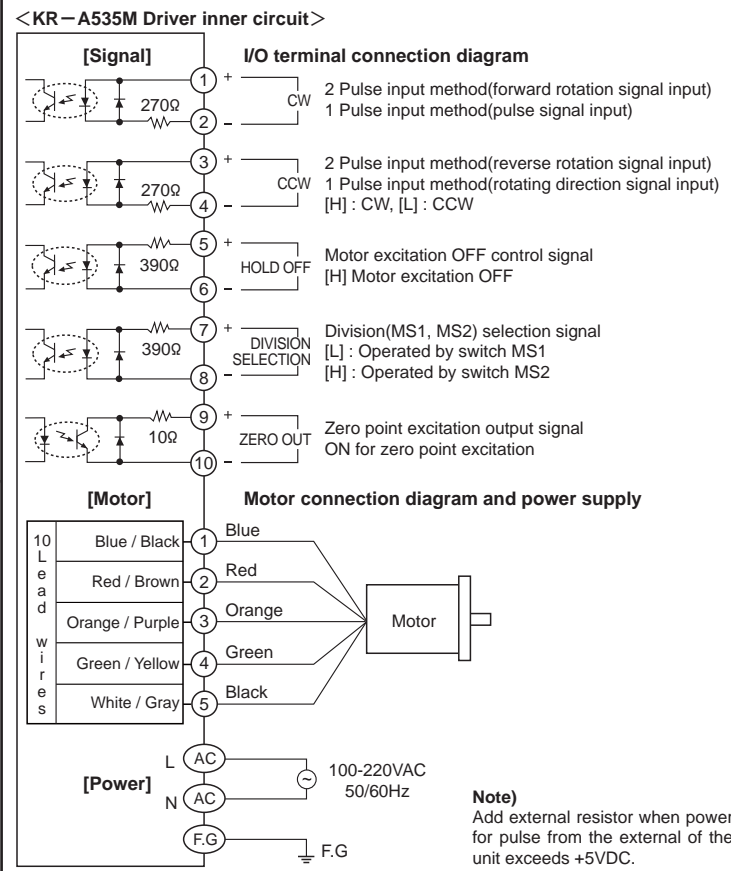
**Time charts**



**Connections**



**Input-Output diagram**



**Function**

◎ Selectable function switch

No	Name	Function	Switch position	
			ON	OFF
1	TEST	Self diagnosis function	250pps rotation	Normal
2	2/1 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.
- **2/1 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.
- **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 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.  
$$1 \text{ step angle of 5-phase stepping motor} = \frac{\text{Basic step angle}(0.72^\circ)}{\text{Resolution}}$$
  
※ 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.

◎ Alarm function

- **Overheat**  
When base temperature of driver is over 80°C, alarm LED(Red) is lighted and motor will be stop holding the excitation. Reset the power after remove the existing factors of overheat that can be occurred to release the Alarm.
- **Overcurrent**  
When overcurrent is applied from breakdown or error to the motor, alarm LED (Red) is Flickered. In case overcurrent occurs, a motor will become HOLD OFF. A driver will resume its normal operation when error causing factors are disappeared.

**Failure diagnosis and management**

- If motor does not rotate
  - Check the connection status of controller and driver and pulse input specification. (Voltage, width)
  - Check the input pulse method and connected method is same.
  - Check pulse and direction signal is connected correctly for 1 pulse input method.
- If motor rotates as a reverse direction
  - Check input pulse connection of CW and CCW is correct for 2 pulse input method.
  - In case of 1-pulse method, it is forward rotation when CCW input is [H] and reverse rotation when CCW input is [L].
- If motor does not work properly
  - Check the connection of driver and motor.
  - Check the pulse input specification of driver. (Voltage, width)
  - Check output current for current adjuster and current for motor operation as correct.
  - After turning off the power, wait at least 15 seconds before turning the power back on.

**Caution for using**

- Caution for signal input
  - 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.
  - In case, the signal input supply is higher than rated supply expressed on the specification, please connect the additional resistor to external part.
- Caution for supplying power
  - Use the power enough to supply the run current when turn on the power.
  - The current value indicated on power supply is the max. input of driver.
- Caution for wiring
  - Use Twist pair(Over 0.2mm<sup>2</sup>) for the signal wire should be shorter than 2m.
  - Please use an electric wire is thicker than the motor lead when product the motor wire connection.
  - Please leave a space over 10cm between a signal wire connection and power wire.
- Caution for installation
  - In order to increase heat protection efficiency, keep the heat sink as close as possible to metal panel and keep it well-ventilated.
  - Excessive heat generation may occur on Driver. Keep the heat sink under 80°C when installing the unit.(In case it is over 80°C, forcible cooling shall be required.)
- Caution for using function switches
  - 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.
  - 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.
- Installation environment
  - It shall be used indoor
  - Pollution Degree 2
  - Altitude Max. 2000m
  - Installation Category II

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