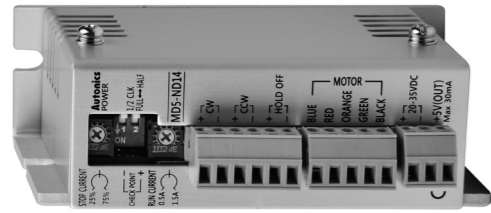


Autonics Motor Driver (5-phase Stepper Motor Driver) MD5-ND14

INSTRUCTION MANUAL



Thank you for choosing our Autonics product.
Please read the following safety considerations before use.

Safety Considerations

- ⚠ Please observe all safety considerations for safe and proper product operation to avoid hazards.
- ⚠ symbol represents caution due to special circumstances in which hazards may occur.
- Warning** Failure to follow these instructions may result in serious injury or death.
- Caution** Failure to follow these instructions may result in personal injury or product damage.

Warning

- Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss.** (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)
Failure to follow this instruction may result in fire, personal injury, or economic loss.
- Do not connect, repair, or inspect the unit while connected to a power source.**
Failure to follow this instruction may result in fire.
- Install the unit after considering counter plan against power failure.**
Failure to follow this instruction may result in personal injury, or economic loss.
- Check 'Connections' before wiring.**
Failure to follow this instruction may result in fire.
- Do not disassemble or modify the unit.**
Failure to follow this instruction may result in fire.
- Install the driver in the housing or ground it.**
Failure to follow this instruction may result in personal injury, or fire.
- Do not touch the unit during or after operation for a while.**
Failure to follow this instruction may result in burn due to high temperature of the surface.
- Emergency stop directly when error occurs.**
Failure to follow this instruction may result in fire, or personal injury.

Caution

- When connecting the power input, use AWG 18(0.75mm²) cable or over.**
- Install over-current prevention device (e.g. the current breaker, etc) to connect the driver with power.**
Failure to follow this instruction may result in fire.
- Check the control input signal before supplying power to the driver.**
Failure to follow this instruction may result in personal injury or product damage by unexpected signal.
- Install a safety device to maintain the vertical position after turn off the power of this driver.**
Failure to follow this instruction may result in personal injury or product damage by releasing holding torque of the motor.
- Use the unit within the rated specifications.**
Failure to follow this instruction may result in fire or product damage.
- Use dry cloth to clean the unit, and do not use water or organic solvent.**
Failure to follow this instruction may result in fire.
- Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.**
Failure to follow this instruction may result in fire or explosion.
- The driver may overheat depending on the environment.**
Install the unit in the well ventilated place and forced cooling with a cooling fan.
Failure to follow this instruction may result in product damage and degradation.
- Keep metal chip, dust, and wire residue from flowing into the unit.**
Failure to follow this instruction may result in fire or product damage.
- Use the designated motor only.**
Failure to follow this instruction may result in fire or product damage.

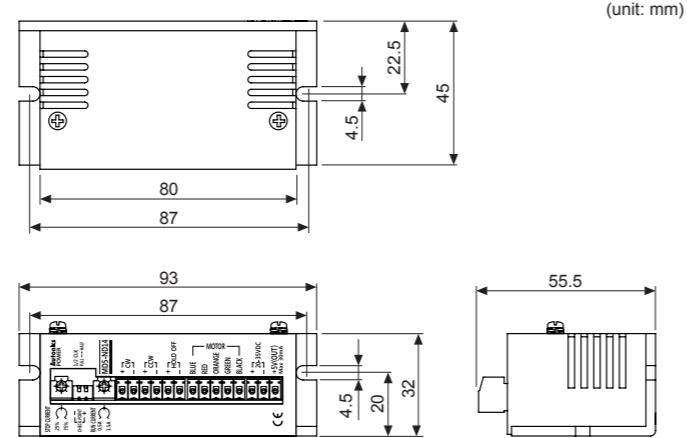
⚠ The above specifications are subject to change and some models may be discontinued without notice.
⚠ Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).

Specifications

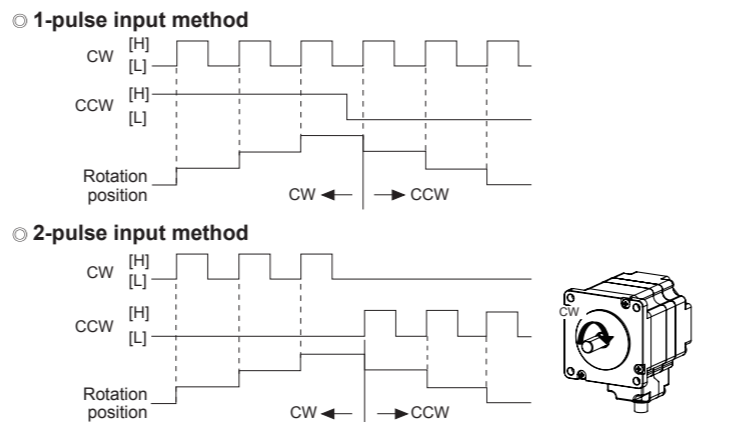
Model	MD5-ND14
Power supply ^{※1}	20-35VDC
Allowable voltage fluctuation range	90 to 110% of the rated voltage
Max. current consumption ^{※2}	3A
RUN current ^{※3}	0.5-1.5A/Phase
STOP current	25 to 75% of RUN current (set by STOP current volume)
Drive method	Bipolar constant current pentagon drive
Basic step angle	0.72°/Step
Resolution	1-division (0.72°/Step), 2-division (0.36°/Step)
Pulse width characteristic	Pulse width: Min. 10μs (CW, CCW), Min. 1ms (HOLD OFF) Duty Rate: 50% (CW, CCW)
Rising/Falling time	Below 130ns (CW, CCW)
Pulse input voltage	[H]: 4-8VDC, [L]: 0-0.5VDC
Pulse input current	7.5-14mA (CW, CCW), 10-16mA (HOLD OFF)
Input pulse frequency ^{※4}	Max. 50kHz (CW, CCW)
Input resistance	390Ω (CW, CCW, HOLD OFF)
Insulation resistance	Over. 100MΩ (at 500VDC megger, between all terminals and case)
Dielectric strength	1,000VAC 50/60Hz for 1min.(between all terminals and case)
Noise resistance	±500V the square wave noise (pulse width: 1μs) by the noise simulator
Vibration	Mechanical: 1.5mm amplitude at frequency of 5 to 60Hz(for 1 min.) in each X, Y, Z direction for 2 hours Malfunction: 1.5mm amplitude at frequency of 5 to 60Hz(for 1 min.) in each X, Y, Z direction for 10 min.
Environment	Ambient temp.: 0 to 40°C, storage: -10 to 60°C Ambient humi.: 35 to 85%RH, storage: 35 to 85%RH
Approval	CE, RoHS
Weight ^{※5}	Approx. 183g (approx. 130g)

- ※1: When using over 30VDC power supply, torque characteristics are improved but the driver temperature raise. The unit should be installed at the well ventilation environment.
- ※2: Based on ambient temperature 25°C, ambient humidity 55%RH.
- ※3: RUN current varies depending on the input RUN frequency and max. RUN current at the moment varies also varies depending on the load.
- ※4: Max. input pulse frequency is max. frequency to be input and is not same as max. pull-out frequency or max. slewing frequency.
- ※5: The weight includes packaging. The weight in parenthesis is for unit only.
- ※Environment resistance is rated at no freezing or condensation.

Dimensions

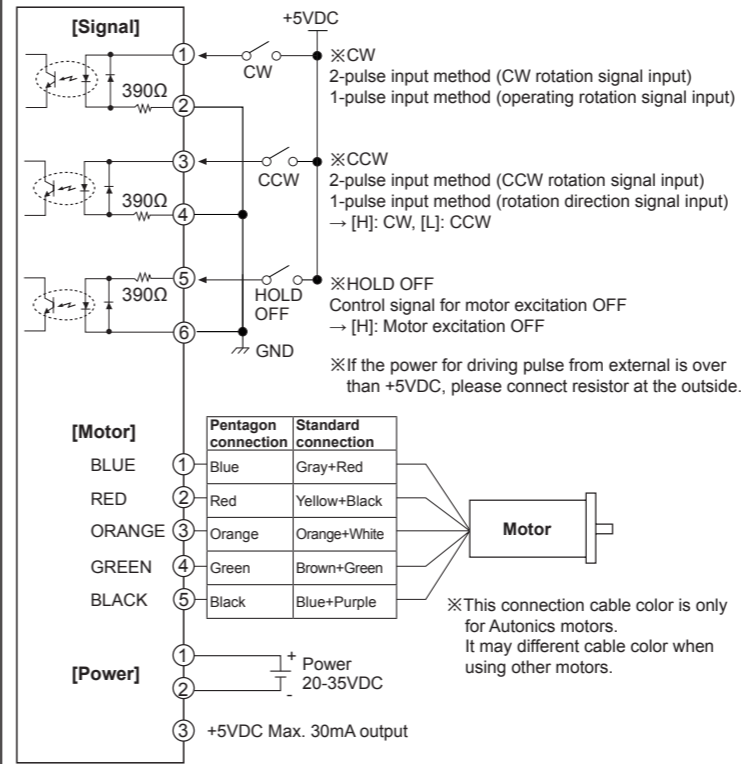


Time Chart



⚠ Do not input CW, CCW signals at the same time in 2-pulse input method.
It may not operate properly if another direction signal is inputted when one of CW or CCW is [H].

I/O Circuit and Connections



Function Selection DIP Switch

No.	Nameplate	Function	Switch position	
			ON	OFF (factory default)
1	1/2 CLK	Pulse input method	1-pulse input method	2-pulse input method
2	FULL ↔ HALF	Select resolution	1-division (0.72°)	2-division (0.36°)

⚠ Changing pulse input method or resolution is available only when stepper motor stops. If changing the resolution during operation, the motor may be out of phase.

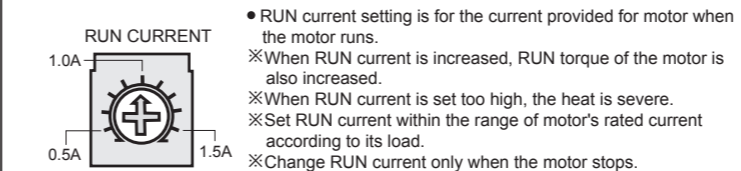
1/2 CLK

- 1/2 CLK switch is to select pulse input method.
- 1-pulse input method: CW → operating rotation signal input, CCW → rotation direction signal input ([H]: CW, [L]: CCW)
- 2-pulse input method: CW → CW rotation signal input, CCW → CCW rotation signal input.

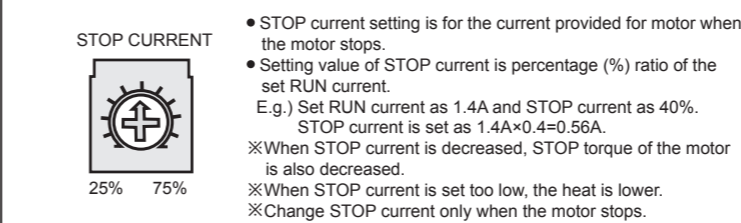
FULL ↔ HALF

- FULL ↔ HALF switch is to set basic step angle for 5 phase stepper motor.
- ⚠ Change resolution only when the motor stops.

Setting RUN current



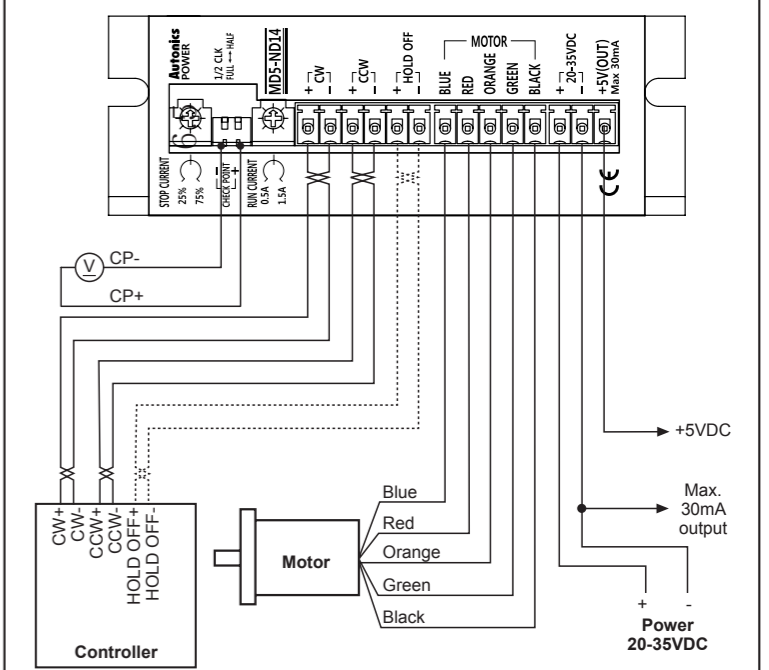
Setting STOP current



HOLD OFF function

- This signal is for rotating motor's axis using external force or used for manual positioning.
- When hold off signal maintains over 1ms as [H], motor excitation is released.
- When hold off signal maintains over 1ms as [L], motor excitation is in a normal status.
- ⚠ Must stop the motor for using this function.
- ⚠ Refer to I/O Circuit And Connections.

Connections



Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- 20-35VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- Re-supply power after min. 1 sec from disconnected power.
- Do not input CW, CCW signal at the same time in 2-pulse input method.
- When the signal input voltage is exceeded the rated voltage, connect additional resistance at the outside.
- Set RUN current within the range of motor's rated current depending on the load. When the rated motor current is over, the heat may be increased and motor may be damaged.
- If motor stops, switching for STOP current executed by the current down function. When hold off signal is [H] or current down function is off, the switching does not execute.
- Use twisted pair (over 0.2mm²) for the signal cable which should be shorter than 2m.
- The thickness of cable should be same or thicker than the motor cable's when extending the motor cable.
- Keep the distance between power cable and signal cable more than 10cm.
- If the TEST switch is ON, the motor operates immediately and it may be dangerous.
- Do not change any setting switches (function, run/stop current, resolution switches) during the operation or after supplying power.
Failure to follow this instruction may result in malfunction.
- Motor vibration and noise can occur in specific frequency period
① Change motor installation method or attach the damper.
② Use the unit out of the dedicated frequency range when vibration and noise occurs due to changing motor RUN speed.
- For using motor, it is recommended to maintenance and inspection regularly.
① Unwinding bolts and connection parts for the unit installation and load connection
② Strange sound from ball bearing of the unit
③ Damage and stress of lead cable of the unit
④ Connection error with motor
⑤ Inconsistency between the axis of motor output and the center, concentric (eccentric, declination) of the load, etc.
- This product does not prepare protection function for a motor.
- This unit may be used in the following environments.
① Indoors (in the environment condition rated in 'Specifications')
② Altitude max. 2,000m
③ Pollution degree 2
④ Installation category II

Major Products

- Photoelectric Sensors
- Fiber Optic Sensors
- Door Sensors
- Door Side Sensors
- Area Sensors
- Proximity Sensors
- Pressure Sensors
- Rotary Encoders
- Connector/sockets
- Switching Mode Power Supplies
- Control Switches/Lamps/Buzzers
- I/O Terminal Blocks & Cables
- Stepper Motors/Drivers/Motion Controllers
- Graphic/Logic Panels
- Field Network Devices
- Laser Marking System (Fiber, CO₂, Nd: YAG)
- Laser Welding/Cutting System
- Temperature Controllers
- Temperature/Humidity Transducers
- SSRs/Power Controllers
- Counters
- Timers
- Panel Meters
- Tachometer/Pulse (Rate) Meters
- Display Units
- Sensor Controllers

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