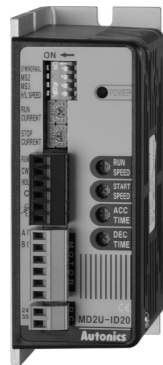


Autonics

2-Phase Unipolar Intelligent Stepper Motor Driver MD2U-ID20

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.
- For rotating the motor manually when turning off the power, separate the motor and the driver.**
Power may be supplied to the driver.
- 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.

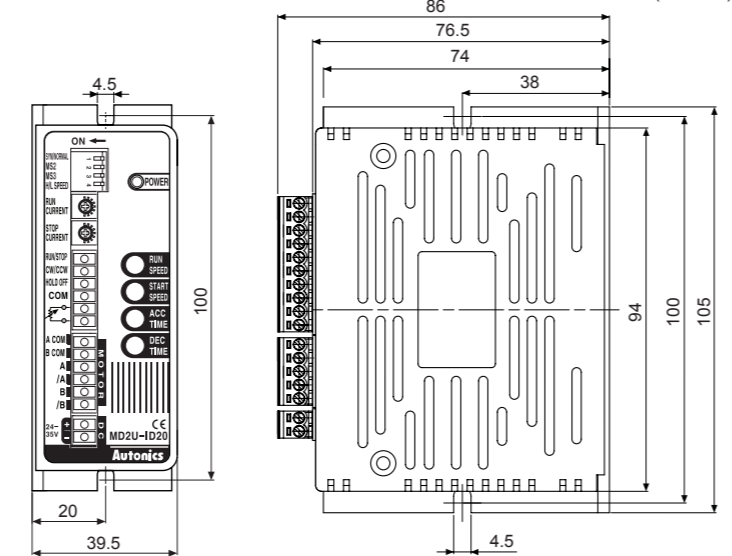
※The above specifications are subject to change and some models may be discontinued without notice.
 ※Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).

■ Specifications

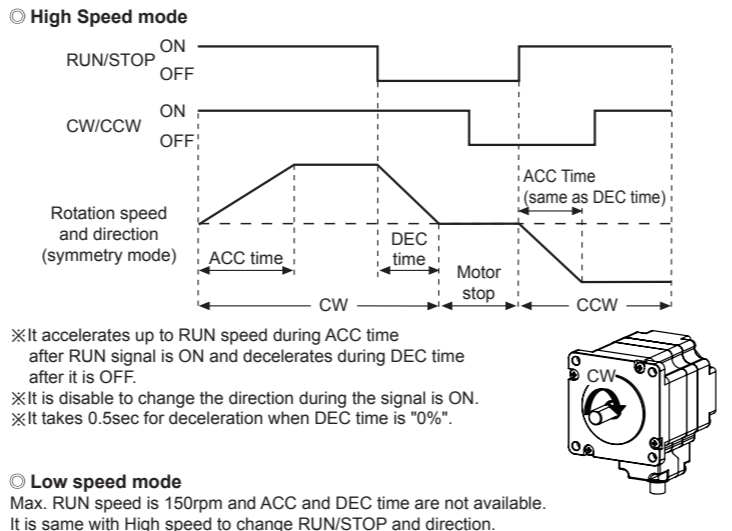
Model	MD2U-ID20
Power supply*1	24-35VDC=
Allowable voltage range	90 to 110% of rating voltage
Max. current consumption*2	3A
RUN current*3	0.5-2A/Phase
STOP current	20 to 70% of RUN current (set by STOP current volume)
RUN method	Unipolar constant current drive type
Basic step angle	1.8°/step
Max. drive speed	1500rpm
Input resistance	3.3kΩ (CW/CCW, RUN/STOP, HOLD OFF)
Insulation resistance	Over 200MΩ (at 500VDC megger, between all terminals and case)
Dielectric strength	1000VAC 50/60Hz for 1 minute (between all terminals and case)
Noise immunity	±500V the square wave noise (pulse width:1μs) by the noise simulator
Vibration	1.5mm amplitude at frequency of 10 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours
Shock	300m/s ² (approx. 30G) in each X, Y, Z direction for 3 times
Environ-ment	Ambient temp. 0 to 50°C, storage: -10 to 60°C Ambient humi. 35 to 85%RH, storage: 35 to 85%RH
Approval	CE
Weight*4	Approx. 303g (approx. 190g)

※1: Since torque characteristics are improved but the driver temperature rises with the 30VDC power supply, the driver should be installed at the well ventilated environment. Torque is variable by power supply.
 ※2: Based on the ambient temperature 25°C, ambient humidity 55%RH.
 ※3: RUN current varies depending on the input RUN frequency, and the max. instantaneous RUN current varies also.
 ※4: The weight includes packaging. The weight in parenthesis is for unit only.
 ※Environment resistance is rated at no freezing or condensation.

■ Dimensions



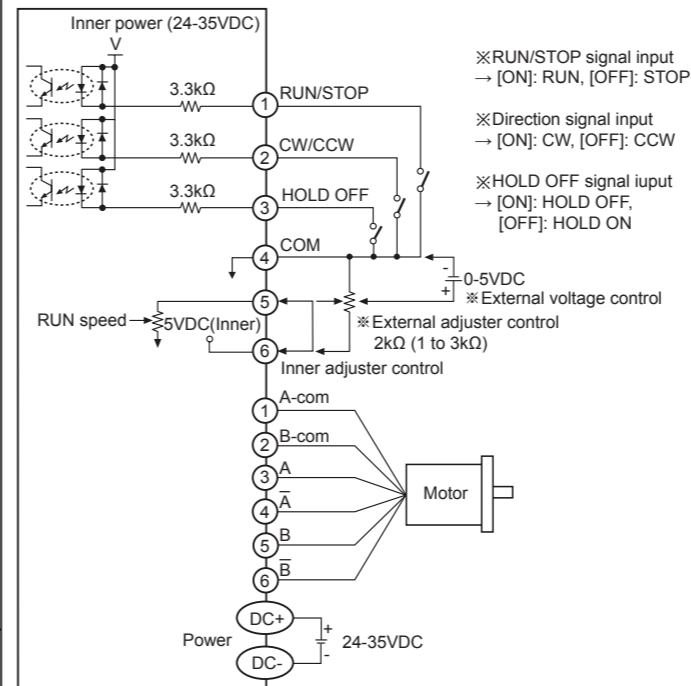
■ Time Chart



■ Troubleshooting

- When the motor does not rotate**
 ① Check the connection of controller and driver.
- When motor rotates to the reverse direction**
 ① Check the DIR input of the driver.
 ② DIR input is [ON] for CW, and [OFF] for CCW.
- When operation of motor is unstable**
 ① Check whether driver and motor are connected correctly.
 ② Check whether output current of the driver by current setting is proper for operation of the motor.

■ I/O Circuit and Connections



※1: Inner adjuster is correlated to external adjuster control and external voltage control. Make sure that inner adjuster must be set to maximum in order to set maximum Run speed using external adjuster and external voltage.

■ Functions

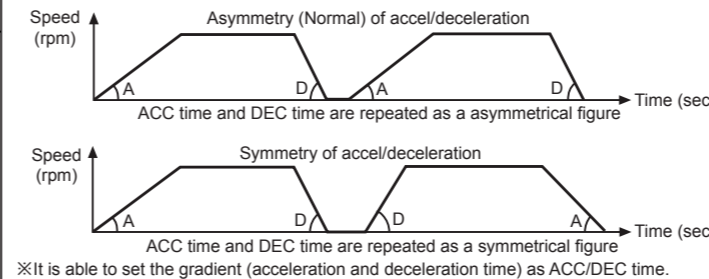
○ Function DIP Switch

No.	Name	Function	Switch position		
			ON	OFF	
1	SYM/NORMAL	SYM/NORMAL	Symmetry	Asymmetry	
2	MS2	Max. speed	MS2 MS3	H/L SPEED	Max. speed (rpm)
3	MS3		ON ON	ON: High speed	1350
			ON OFF	OFF ON	1000
			OFF OFF	OFF OFF	500
4	H/L SPEED	High/Low speed	D*1	D*1	OFF: Low speed 150

※1: D=Don't care
 ※Reboot the driver after changing function selection switch.

○ Selection of Symmetry/Asymmetry

※The function to make the ACC/DEC time of run-speed as asymmetry or symmetry using DIP switch No. 1.



○ Selection of max. speed (MS2, MS3)

※The function to select the max. speed of motors.
 ※The max. speed of stepper motor is changed by MS2/MS3 and Hi/Low speed.
 ※The features of run and vibration are able to change depending on MS2, MS3.
 ※Lower the max. speed to run a motor smoothly.

○ Selection of H/L SPEED

※H/L SPEED mode selection switch
 : Accel/deceleration control is not available in Low speed mode since all sections are included in Pull-in range.
 ※Low speed mode: It is able to drive a motor up to 150rpm of max. drive speed.
 ※High speed mode: It is able to drive a motor up to 1500rpm of max. drive speed.

○ Setting RUN current

• RUN current setting is for the current provided to the motor in running status.
 ※When RUN current is increased, RUN torque of the motor is also increased.
 ※When RUN current is set too high, the heat of the motor is increased.
 ※Set RUN current properly for the load within the rated current range of the motor.
 ※RUN current setting range: 0.5 to 2.0A
 ※RUN current setting method: Measure the voltage by connecting a DC voltage meter to both CT+ and CT- terminals while the motor is running (max. 150rpm).
 E.g.) Input voltage (3V) × $\frac{2}{3}$ = 2A (motor excitation current)
 ※Change RUN current only when the motor stops.

○ Setting STOP current

STOP CURRENT
 • STOP current setting is for the current provided to the motor in stopped status, preventing severe heat of the motor.
 • This function is for reducing the heat by variable resistance ratio setting within 0 to 100% of RUN current setting range (actual setting range: 20 to 70%).
 E.g.) In case of RUN current setting value is 2A and STOP current setting value is 0% (actual setting range: 20%), STOP current is 2A×0.2=0.4A.
 ※When STOP current is decreased, STOP torque of the motor is also decreased.
 ※When STOP current is set low, the heat of the motor is also low.
 ※Change STOP current only when the motor stops.

○ Setting RUN speed

RUN SPEED
 ※It sets max. RUN speed.
 ※Max. RUN speed can be different depending on max. speed setting (MS2, MS3) and driving mode setting (Hi/Low speed).
 ※Since missing step can occur due to max. input pulse frequency of motors, consider motor type and its RUN current when setting max. RUN speed.
 ※Set the value only when the motor stops.

○ Setting START speed

START SPEED
 ※It sets START speed.
 ※Max. START speed value is same with RUN speed value.
 ※Although START speed must be set within max. starting frequency, it is recommended to set up START speed within 0 to 50% for stable driving.
 ※Set the value only when the motor stops.

○ Setting ACC time

ACC TIME
 ※It sets the acceleration time from START speed to max. RUN speed.
 ※Operates in AT_1 operation mode when ACC time is under 33.3%, AT_2 operation mode when ACC time is under 66.6%, and AT_3 operation mode when ACC time is over 66.6%.
 ※AT_1 is 0.5 sec when RUN speed=100%, START speed=0%.
 ※AT_2 is 1 sec when RUN speed=100%, START speed=0%.
 ※AT_3 is 2 sec when RUN speed=100%, START speed=0%.
 ※Set the value only when the motor stops.

○ Setting DEC time

DEC TIME
 ※It sets the deceleration time from max. RUN speed to STOP.
 ※Operates in DT_1 operation mode when DEC time is under 33.3%, DT_2 operation mode when DEC time is under 66.6%, and DT_3 operation mode when DEC time is over 66.6%.
 ※DT_1 is 0.5 sec when RUN speed=100%, START speed=0%.
 ※DT_2 is 1 sec when RUN speed=100%, START speed=0%.
 ※DT_3 is 2 sec when RUN speed=100%, START speed=0%.
 ※Set the value only when the motor stops.
 ※ACC Time and DEC Time are declined in proportion to the setting value of START speed.
 ※The figures above indicate the factory default for each value.

○ HOLD OFF function

• This signal is for rotating axis of the motor with external force or 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.
 ※Use this function only when the motor stops.
 ※Refer to I/O Circuit and Connections.

■ Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- 24-35VDC 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.
- 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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