

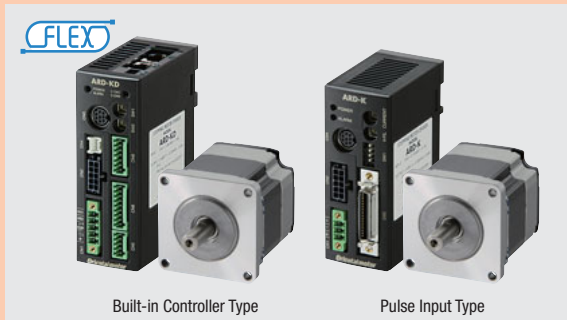
AR Series

<Additional Information>

- Technical reference → Page H-1
- Regulations & Standards → Page I-2



● For detailed information about regulations and standards, please see the Oriental Motor website.



A closed loop stepper motor series that substantially reduces heat generation from the motor through the use of high-efficiency technology. The driver is a highly functional, compact DC power supply input type.

- High Reliability with Closed Loop Control
- High Efficiency Technology Reduces Motor Heat Generation
- Capable of High Positioning Accuracy
- 2 Driver Types to Choose from
Built-in Controller Type **FLEX**/Pulse Input Type

FLEX What is FLEX?

FLEX is the collective name for products that support I/O control, Modbus (RTU) control, and FA network control via network converters. These products enable simple connection and simple control, shortening the total lead time for system construction.

Features

High Reliability with Closed Loop Control

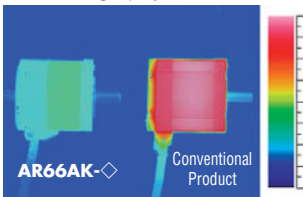
For details, refer to Page A-9 "Overview of Closed Loop Stepper Motor and Driver Packages α STEP".

Continuous Operation Utilizing High-Efficiency Technology

● Lower Heat Generation

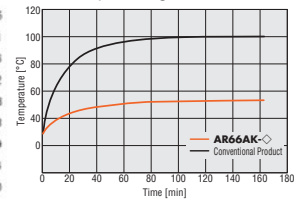
Heat generation by the motor has been significantly reduced through higher efficiency.

- Temperature Distribution by Thermography



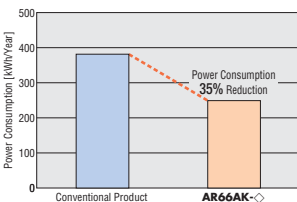
Comparison under the Same Conditions.

- Motor Case Temperature under Same Operating Conditions



● 35% Less Power Consumption* than Conventional Oriental Motor Products Due to Energy-Saving Features

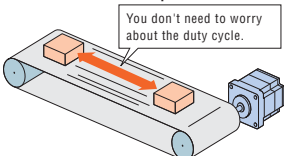
- Power Consumption



*Operating Condition
 · Speed: 400 r/min, load factor 50%
 · Operating Time: 24 hours of operation, 365 days/year (70% operating, 25% stand-by, 5% off)

● Continuous Operation (Operation at a High Duty Cycle)

The **AR** Series can be operated at high frequency. The motor can operate continuously.

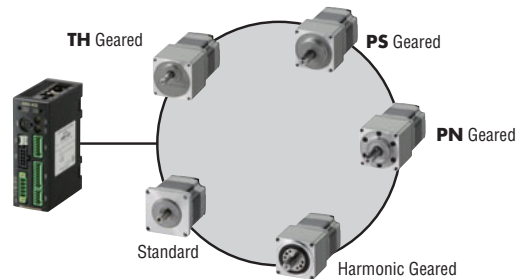


Note

- If the motor is operated continuously, a heat sink of a capacity at least equivalent to an aluminum plate with a size of 100×100 mm, 6 mm thick is required.

A Single Driver to Support a Variety of Motors

The driver is equipped with an automatic recognition function, which recognizes the attached motor. Various types of motors, such as the standard type and the geared type, can be attached to a single driver. Therefore, there is no need to change the driver to match the motor to be attached. Maintenance is easier.



Products Equipped with the AR Series

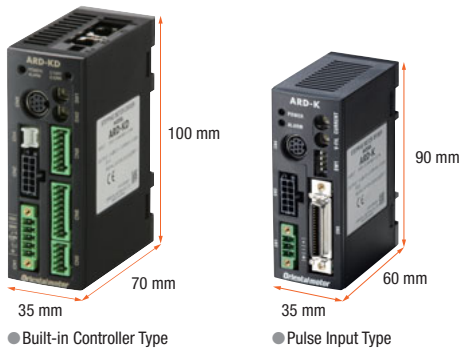
All of the products equipped with the **AR** series feature standardized controllability.



Highly Functional, Compact Driver

● Compact DC Power Supply Input Driver

This is a compact driver. This contributes to space saving for the control box and equipment. The driver can be installed directly to a DIN rail, so no screws are necessary.

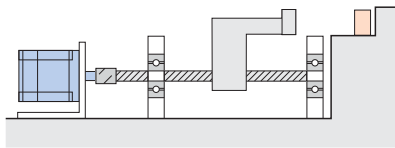


● Push-Motion Operation

A force is continuously applied to the load. When contact is made with the load, the motor switches to push-motion operation and applies constant torque to the load.

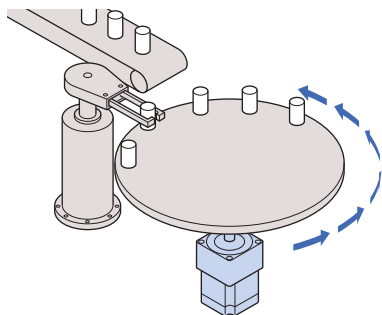
Note

- Push-motion operation requires a data module **OPX-2A** (sold separately) or data setting software **MEXE02**.
- Do not perform push-motion operation using geared motors. Doing so may damage the motor or gear unit.



● Position Control in the Same Direction

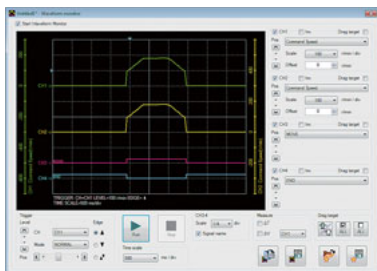
The round feature enables you to control positioning even in an application where positioning is repeated in the same direction. (Available only on the built-in controller type.)



Easy Setting and Easy Monitoring

By using the **MEXE02** data setting software, a computer can be used to change operating data or parameters, as well as to perform monitoring.

● Operating Status Waveform Monitoring (**MEXE02**)

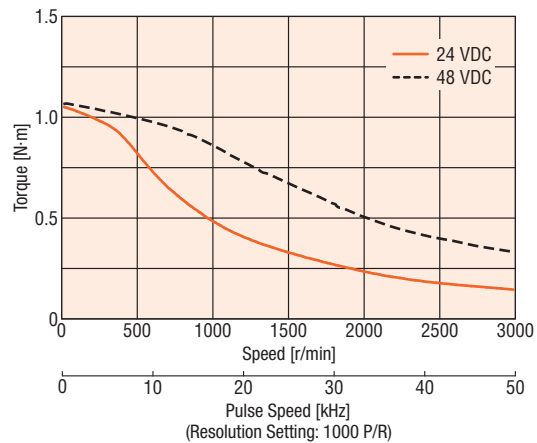


A highly efficient monitoring function that allows for easy identification of the motor and I/O status at a glance.

● 48 VDC Compatible

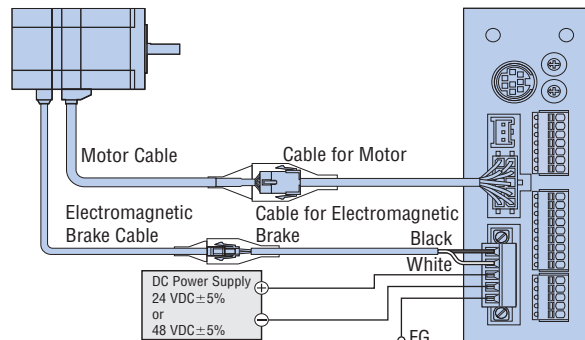
The motor runs on a 24 VDC or 48 VDC power supply. Choose the power supply that you have available. The torque is higher when 48 VDC is used rather than 24 VDC. (Frame size 20 mm and 28 mm only accepts 24 VDC input.)

AR66AK-◇



● Automatically Controlled Electromagnetic Brake

For built-in controller types, customers need not provide a separate circuit to control the electromagnetic brake. The electromagnetic brake is released when the motor is excited (= the current ON input is turned ON), and activated to hold the load in position when the excitation is cut off (= the current ON input is turned OFF). (Available only on the built-in controller type.)



● Up to 30 m Wiring Distance Between Motor and Driver

This series uses an included cable or accessory cable that can extend the wiring distance between the motor and driver up to 30 m. Extension cables and flexible extension cables are available as accessories (sold separately).

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Motor Only /Driver Only

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PKP/PK

Geared
PKP/PK

0.72°/0.36°
PKP/PK

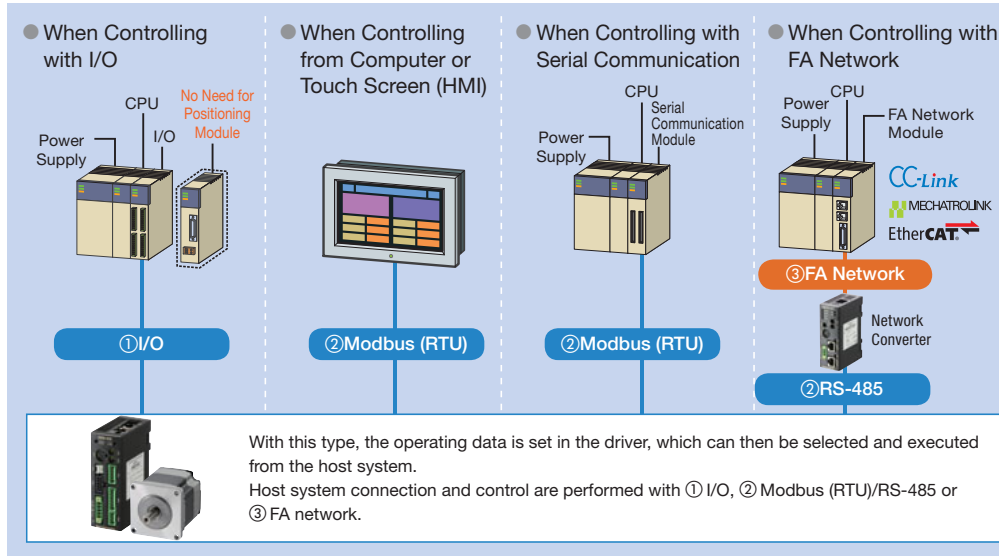
Driver

Accessories

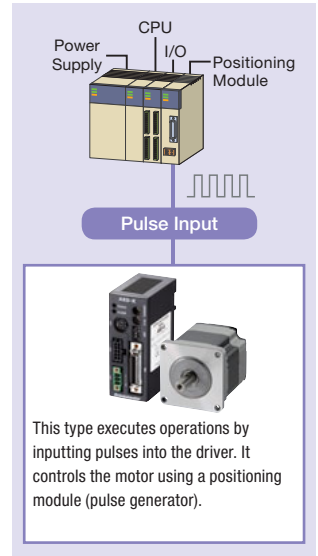
2 Driver Types Available Depending on the System Configuration

2 types of **AR** Series drivers are available, depending on the master control system in use.

● Built-in Controller Type **FLEX**



● Pulse Input Type

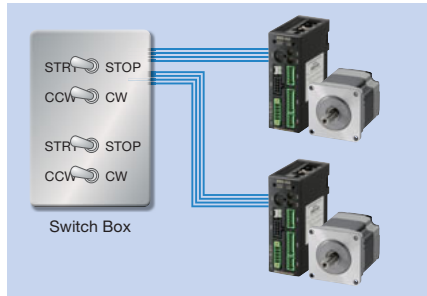


● Control System Configuration for Built-in Controller Type

① I/O Control

The positioning module (pulse generator) function is built into the driver, and therefore an operation system using I/O can be created by connecting directly to a switch box or PLC. A positioning module is not necessary on the PLC side, saving space and simplifying the system.

● Example of Using a Switch Box

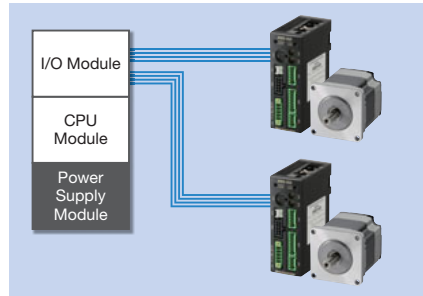


Operating data is set in the driver, and the motor can be started or stopped simply by connecting a switch. Control can be performed easily without using PLC.

Easy Control

Low-Cost Design

● Example of Using PLC



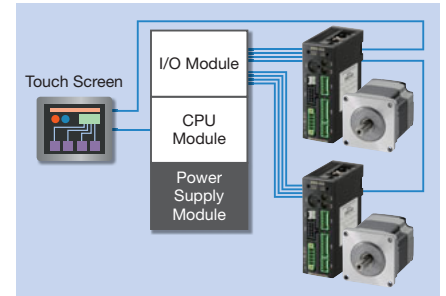
When using PLC, an operation system can be created by connecting directly to an I/O module. A positioning module is not necessary on the PLC side, therefore space is saved and the system is simplified.

Easy Control

Low-Cost Design

Space Saving

● Example of Using PLC and a Touch Screen



Normally, the motor is started and stopped with I/O. Changing the operating data settings and displaying the monitors and alarms is performed with the touch screen using Modbus (RTU) communication. When there is a lot of setup work, changes can be easily performed on the touch screen, and the burden of creating ladders is reduced.

Easy Control

Support for Small Lots of Multiple Products

② Control via Modbus (RTU)/RS-485 Communication

RS-485 communication can be used to set operating data and parameters and input operation commands. Up to 31 drivers can be connected to 1 serial communication module. There is a function that enables multiple shafts to be started simultaneously. The Modbus (RTU) protocol is supported and can be used to connect to touch screens and computer.

Easy Control

Simple Wiring

Supports Brands of Serial Module

Motor Controlled by Computer

Simplified System

③ Control via FA Network

By using a network converter (sold separately), CC-link, MECHATROLINK or EtherCAT communication are possible. These can be used to set operating data and parameters and input operation commands.

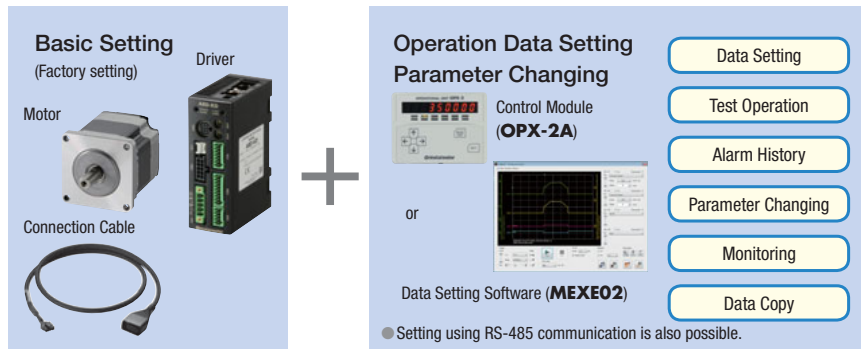
Easy Control

Simple Wiring

Multi-Axis Control at Low Cost

Built-in Controller Type

Because the driver has the information necessary for motor operation on built-in controller types, the burden on the host PLC is reduced. The system configuration when using multi-axis control has been simplified. Settings are configured using a control module (sold separately), data setting software or RS-485 communication.



● Operation Types

In the built-in controller type, the operating speed and traveling amount of the motor are set with operating data, and operation is performed according to the selected operating data. There are four types of motor operations.

	Item	Description		
Common	Control Method	I/O control		
		RS-485 Communication	Network Converter Connection Modbus RTU Protocol Connection	
	Position Command Input	Setting with operating data number	Command range for each point: -8388608~8388607 [step] (Setting unit: 1 [step])	
	Speed Command Input	Setting with operating data number	Command Range: 0~1000000 [Hz] (Setting unit: 1 [Hz])	
	Acceleration/Deceleration Command Input	Set with the operating data number or parameter. The acceleration/deceleration rate [ms/kHz] or acceleration/deceleration time [s] can be selected. Command Range: 0.001~1000.000 [ms/kHz] (Setting unit: 0.001 [ms/kHz]) 0.001~1000.000 [s] (Setting unit: 0.001 [s])		
	Acceleration/Deceleration Processing	Velocity Filter, Movement Average Filter		
Return-To-Home Operation	Return-to-Home Modes	2-Sensor Mode	A return-to-home operation that uses a limit sensor (+LS, -LS).	
		3-Sensor Mode	A return-to-home operation that uses a limit sensor and a HOME sensor.	
		Pushing Mode*1	A return-to-home operation by pressing the table against the mechanical end of a linear slide, etc.	
		Position Preset	A function where P-PRESET is input at the desired position to confirm the home position. The home position can be set to the desired value.	
Positioning Operation	Number of Positioning Points	64 points (No. 0~63)		
	Operating Modes	Incremental mode (Relative positioning)		
		Absolute mode (Absolute positioning)		
	Operation Functions	Independent Operation	A PTP (Point to Point) positioning operation.	
		Linked Operation	A multistep speed-change positioning operation that is linked with operating data.	
		Linked Operation 2	A positioning operation with a timer that is linked with operating data. The timer (dwell time) can be set from 0~50.000 [s]. (Setting unit: 0.001 [s])	
	Start Methods	Push-Motion Operation*1	Continuous pressurizing position operations are performed with respect to the load. Maximum speed of operation is 500 [r/min] on the motor shaft.	
Operating Data Selection Method		Starts the positioning operation when START is input after selecting MO~M5.		
Direct Method (Direct positioning)		Starts the positioning operation with the operating data number set in the parameters when MS0~MS5 is input.		
Continuous Operation	Sequential Method (Sequential positioning)	Starts the positioning operation in sequence from operating data No. 0 each time SSTART is input.		
	Number of Speed Points	64 points (No. 0~63)		
Other Operations	Speed Change Method	Changes the operating data number.		
	JOG Operation	Regular feed is performed by inputting +JOG or -JOG.		
	Automatic Return Operation	When the motor position is moved by an external force while the motor is in a non-excitation state, it automatically returns to the position where it originally stopped.		
	Control Mode*2	The normal mode and the current control mode can be selected.		

*1 Do not perform push-motion operation using geared type motors. Doing so may damage the motor or gear unit.

*2 Except to further reduce heat generation or noise, using normal mode is recommended.

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CRK

1.8°/Geared
RBK

Motor Only /Driver Only

1.8°/0.9°
PKP/PK

Geared
PKP/PK

0.72°/0.36°
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Driver

Accessories

Positioning Operation

<Operation Functions>

- Independent Operation**
- Linked Operation**
- Linked Operation 2**
- Push-Motion Operation**



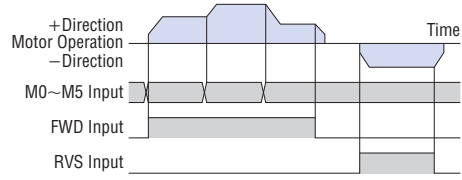
<Start Methods>

- Operating Data Selection Method
- Direct Positioning
- Sequential Positioning

Return-To-Home Operation

- 2-Sensor Mode**
- 3-Sensor Mode**
- Pushing Mode**
- Position Preset**

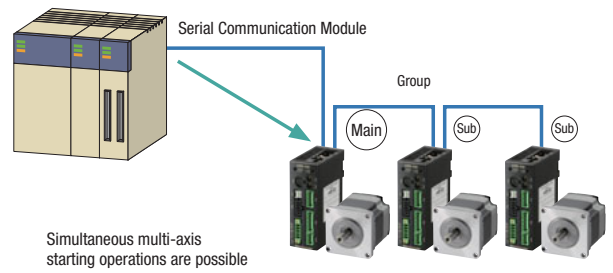
Continuous Operation



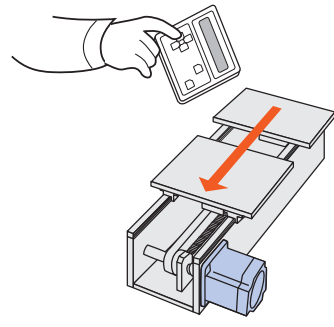
Other Operations

- JOG Operation (Test operation)
- Automatic Return Operation**
 - Equipped with a sequence for return-to-home operation that reduces the burden of the host master and the hassle of creating a ladder.
- Group Send Function**
 Modbus (RTU) communication and FA network have a function that enables multiple shafts to be started simultaneously. Multiple drivers can be grouped together, and when an operation command is sent to the master driver, all the drivers that belong to the same group as the master driver will operate simultaneously.
 - Modbus (RTU) Control: Support for simultaneous start, changes to traveling amount and speed and monitoring
 - FA network control: Simultaneous start only

Example of Modbus (RTU) Communication Control

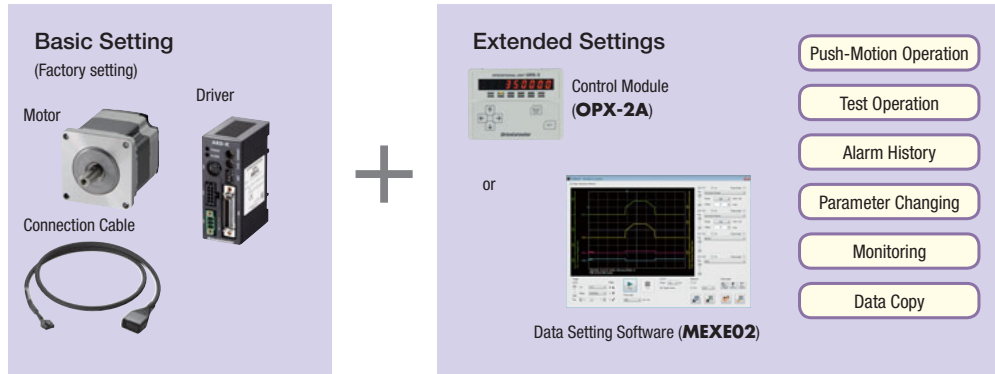


- Teaching Function**
 Teaching can be performed with the **OPX-2A** control module (sold separately) or the **MEXE02*** data setting software. The table is moved to the desired position, and the position data at that time is stored as the positioning data.
 - *The data setting software can be downloaded from the website. Please contact us for details.



Pulse Input Type

The control module (sold separately) and data setting software can be used to change the parameters, display the alarm history, and perform various types of monitoring.



● Main Additional Functions Available with Extended Settings

Item	Overview	Basic Setting	Extended Settings	
Selection of Pulse Input Mode	1-pulse input mode or 2-pulse input (negative logic) mode can be selected.	●	●	
	In addition to the normal settings, the phase difference input can also be set.	—	●	
	· 1-pulse input mode (positive logic/negative logic) · 2-pulse input mode (positive logic/negative logic) · Phase difference input (1-multiplication/2-multiplication/4-multiplication)	—	●	
Resolution Setting	The resolution can be selected with a function switch (D0, D1, CS0, CS1).	●	●	
	The function switch can be used to change each of the corresponding electronic gear values (D0, D1, CS0, CS1).	—	●	
Running Current Setting	The running current setting can be changed with the current setting switch (CURRENT).	●	●	
	The value corresponding to each stage of the current setting switch (CURRENT), 0~F (16 stages), can be changed.	—	●	
Standstill Current Ratio Setting	The ratio of the standstill current relative to the running current can be set.	—	●	
Motor Rotational Coordinates Setting	The rotational coordinates for the motor can be set.	—	●	
Current On Signal (C-ON input)	The input signal for the excitation of the motor.	●	●	
	The logic of the C-ON input during power supply input can be set.	—	●	
Return to Excitation Position Operation During Current On Enable/Disable	Set whether or not to return to the excitation position (deviation 0 position) during current on.	—	●	
I/O Input Signal Mode Selection	Input to select the push-motion operation*1.	—	●	
Alarm Code Signal Enable/Disable	Set to output the code when an alarm occurs.	—	●	
END Output Signal Range Setting	The END output signal range can be changed.	—	●	
END Output Signal Offset	The END output signal value can be offset.	—	●	
A/B Phase Output	This can be used to confirm the position of the motor.	●	●	
Timing Output Signal	This is output each time the motor rotates 7.2°.	●	●	
Velocity Filter Setting	Applies a filter to the operation command to control the motor action.	●	●	
	The values corresponding to each of 0~F (16 levels) for the setting switch.	—	●	
Control Mode	Vibration Suppression Function for Normal Mode	This can be set to suppress resonant vibration during rotation.	—	●
		This can be set to suppress vibration during acceleration, and deceleration, and when stopped.	—	●
	Gain Adjustment for Current Control Mode*2	Adjusts the position and speed loop gain.	—	●
		Adjusts the speed integration time constant.	—	●
Selection of Motor Excitation Position at Power On	Sets the damping control vibration frequency.	—	●	
	Sets whether to enable or disable damping control.	—	●	
Control Module Setting	The motor excitation position for when the power is on can be selected.	—	●	
	Select whether to use symbols or an absolute value display for the speed display of the control module.	—	●	
	The geared motor gear ratio for the speed monitor can be set.	—	●	

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