# Hybrid Control System

αSTEP

# Hybrid Control System αSTEP
# AR Series AC Input

cULus CE

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


Built-in Controller Type　　Pulse Input Type

Stepper motor based hybrid motors utilize a unique control system combining the benefits of "open loop control" and "closed loop control". During normal conditions, these motors provide high response through synchronous operation with commands using open loop control. In an overload situation, the motor position is corrected with the closed loop control and operation is maintained. These are motors that are both easy to use and highly reliable.

- 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

**See Full Product Details Online**
**www.orientalmotor.com**

● Manual ● Specifications ● Dimensions
● CAD ● Characteristics ● Connection and Operation

## Features

### High Reliability with Closed Loop Control

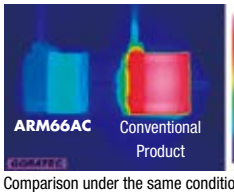
For details, refer to "Overview of Hybrid Control System αSTEP" on page B-3.

### Continuous Operation Utilizing High-Efficiency Technology

#### ●Lower Heat Generation

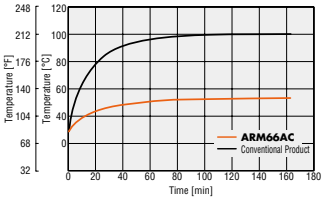
Heat generation by the motor has been significantly reduced through higher efficiency.

● Temperature Distribution by Thermography



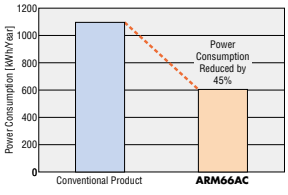

Comparison under the same conditions

● Motor Case Temperature under Same Operating Conditions




#### ●45% Less Power Consumption* than Conventional Oriental Motor Products Due to Energy-Saving Features

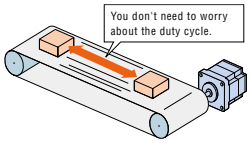
● Power Consumption




✻Operating Condition
- Speed: 1000 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)

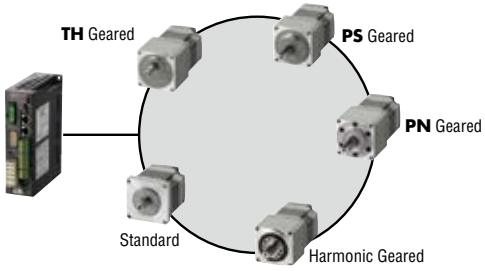
The **AR** Series can be operated at high frequency.
The motor can operate continuously.




Note
● If the motor is operated continuously, a heat sink of a capacity at least equivalent to an aluminum plate with a size of 250 × 250 mm (9.84 × 9.84 in.), 6 mm (0.24 in.) 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.




### Actuators Equipped with AR Series

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

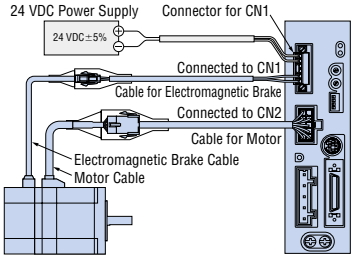
## Easy to Use with High Functionality

### Automatically Controlled Electromagnetic Brake

It is not necessary to 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).

Note

A separate 24 VDC power supply is required for electromagnetic brake control.




### Separation of Main Power and Control Power

The control power-input terminals are provided separately from the main power terminals. This means that even when the main power is cut off due to an emergency stop, etc., the current position can still be detected and alarm information can still be checked, as long as the power (24 VDC) is supplied to the control power-input terminals.

- For the pulse input type, operation is also possible with the main power supply only.

### Up to 30 m (98.4 ft.) Wiring Distance Between Motor and Driver

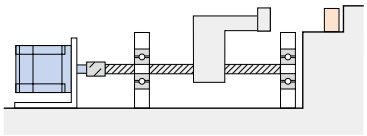
A connection cable can be used to extend the wiring distance up to 30 m (98.4 ft.). Extension cables and flexible extension cables are available as accessories (sold separately).

### 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.

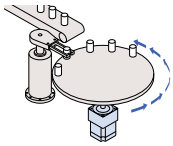
Note

- Push-motion operation requires a data module **OPX-2A** (sold separately) or support 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 wrap 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.)



✻When building an absolute system, the accessory battery is necessary (sold separately).

### Also Supports Absolute Systems

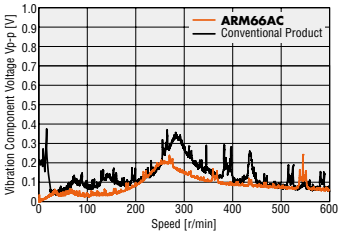
You can build an absolute system that detects absolute positions by connecting the accessory battery (sold separately). (Available only on the built-in controller type.)

- Battery Set (Sold separately)

## A Stepper Motor with Advanced Characteristics, Easier to Use

### Low Vibration

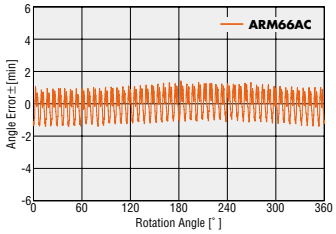
In addition to the microstep drive system, a smooth drive function is equipped to achieve smoother operation.
The smooth drive function automatically implements microstep drive based on the same traveling amount and traveling speed used in the full step mode, without changing the pulse input settings.




### Improved Angular Accuracy

The improved current control technology improves the stop position accuracy of the motor. The result is greater positioning accuracy.

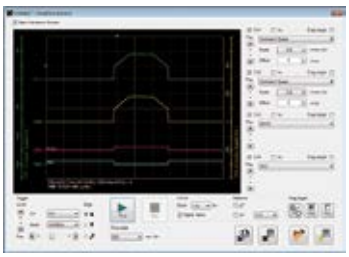
**ARM66AC**: ±3 arcmin (degrees)
Conventional Product: ±5 arcmin (degrees)




## Easy Setting and Easy Monitoring

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

- Monitoring of Operating Condition by Waveform



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

## Complying with Various Standards to Support Diverse Equipment Designs

### Motor Protection Degree: IP65✻

The motor complies with the requirements of protection degree IP65✻ (except for the motor mounting surface and connectors). This means that the enclosure prevents intrusion of dust that can otherwise inhibit normal operation.

✻For double shaft products, the degree of protection is IP20.

### Conforms to International Safety Standards

These products are recognized by UL/CSA and they also bear the CE Marking as a proof of conformance to the Low Voltage and EMC Directives.

### Conforms to Semiconductor Equipment Materials International Standard “SEMI F47”

These products comply with the SEMI Standard on power supply voltage drop, and accordingly can be used effectively in semiconductor manufacturing apparatuses.
Effective for use in semiconductor equipment.
The customer is advised to always evaluate the motor on the actual equipment.

AC Input

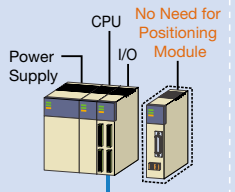
DC Input

## 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.

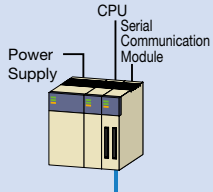
### ●Built-in Controller Type FLEX

①When Controlling with I/O

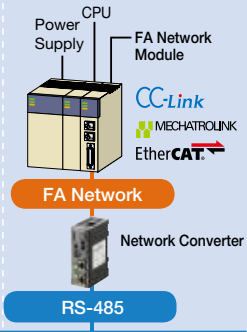



②When Controlling from Computer or Touch Screen (HMI)


②When Controlling with Serial Communication




③When Controlling with FA Network

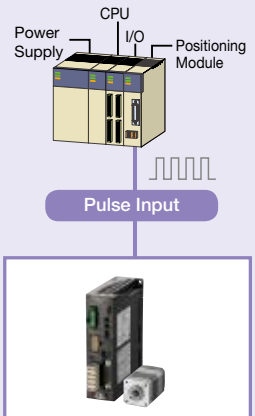



Because the driver stores the information necessary for motor operation, the burden on the host PLC is reduced.
This simplifies the system configuration for multi-axis control. Settings can be configured using support software or RS-485 communications.

● EtherCAT is a registered trademark for which a license is provided by Beckhoff Automation GmbH in Germany.

● CC-Link is a registered trademark of CC-Link Partner Association and MECHATROLINK is a registered trademark of MECHATROLINK Members Association.

### ●Pulse Input Type





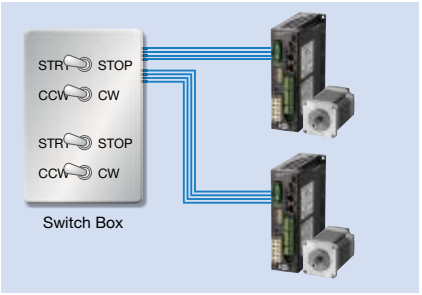

This type executes operations by inputting pulses into the driver. It controls the motor using a positioning module (pulse generator).

### ●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.

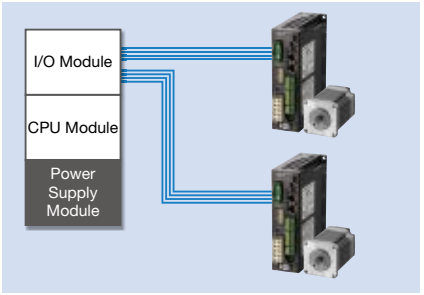
● Example of Using a Switch Box




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

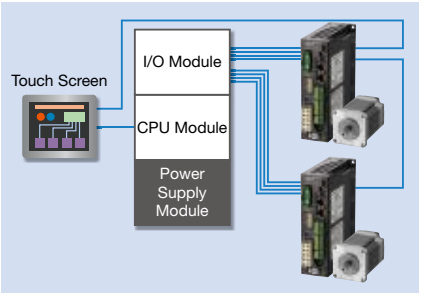
● Example of Using PLC




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 motors to be started simultaneously. The Modbus (RTU) protocol is supported and can be used to connect to touch screens and computers.

Easy Control | Simple Wiring | Supports Brands of Serial Module | Motor Controlled by Computer | Simplified System

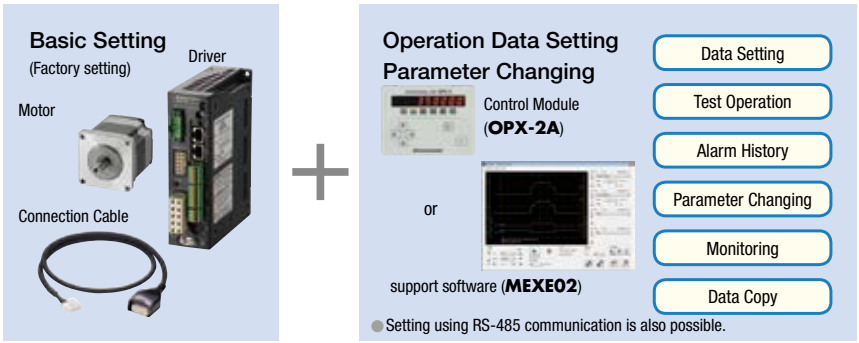
#### ③ Control via FA Network

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 FLEX

Because the driver has the information necessary for motor operation, 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), support 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.

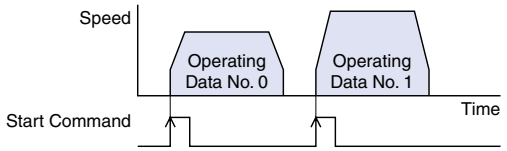
| Item | | Description | |
|---|---|---|---|
| Common | Control Method | I/O control | |
| | | RS-485 Communication | Network converter connection |
| | | | Modbus RTU protocol connection |
| | Position Command Input | Setting with operating data number | Command range for each point: −8388608～8388607 [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.<br>The acceleration/deceleration rate [ms/kHz] or acceleration/deceleration time [s] can be selected.<br>Command Range: 0.001～1000.000 [ms/kHz] (Setting unit: 0.001 [ms/kHz])<br>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.<br>The timer (dwell time) can be set from 0～50.000 [s].<br>(Setting unit: 0.001 [s]) |
| | | Push-Motion Operation*1 | Continuous pressurizing position operations are performed with respect to the load.<br>Maximum speed of operation is 500 [r/min] on the motor shaft. |
| | Start Methods | Operating Data Selection Method | Starts the positioning operation when START is input after selecting M0～M5. |
| | | Direct Method (Direct positioning) | Starts the positioning operation with the operating data number set in the parameters when MS0～MS5 is input. |
| | | Sequential Method (Sequential positioning) | Starts the positioning operation in sequence from operating data No. 0 each time SSTART is input. |
| Continuous Operation | Number of Speed Points | 64 points (No. 0～63) | |
| | Speed Change Method | Changes the operating data number. | |
| Other Operations | 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. | |
| Absolute Backup | | You can build an absolute system by using a battery (accessory). | |

*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.

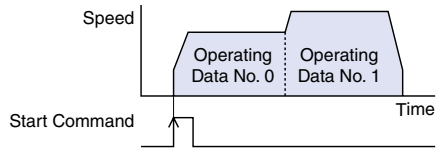
## Positioning Operation

<Operation Functions>

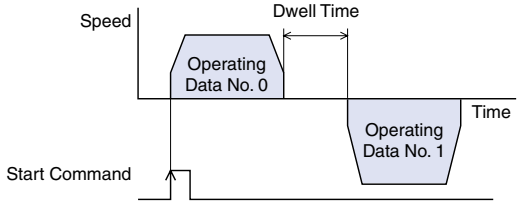
- Independent Operation



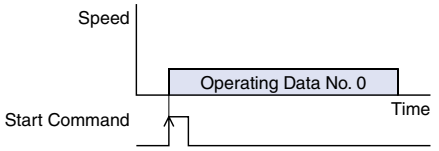

- Linked Operation




- Linked Operation 2




- Push-Motion Operation

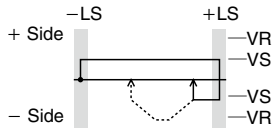



<Start Methods>

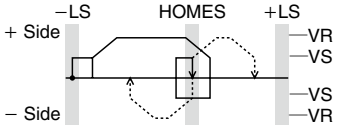
- Operating Data Selection Method
- Direct Positioning
- Sequential Positioning

## Return-To-Home Operation

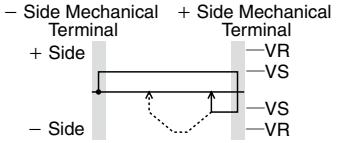
- 2-Sensor Mode




- 3-Sensor Mode

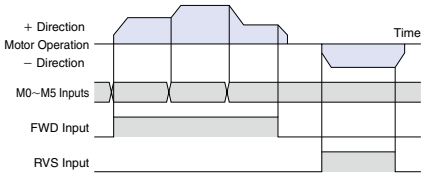



- Pushing Mode




- Position Preset

## Continuous Operation




## Other Operations

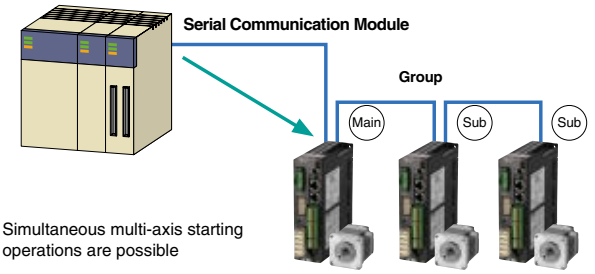
- JOG Operation (Test operation)
- Automatic Return Operation
  - Equipped with a sequence for return-to-home operation that reduces the burden of the host master and the hassle of creating a ladder.

### Group Send Function

Modbus (RTU) communication and FA network have a function that enables multiple motors 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

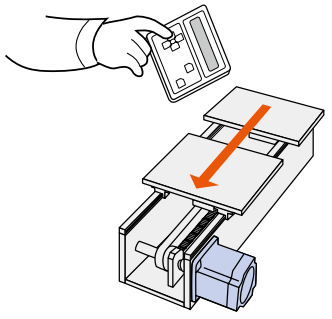



Simultaneous multi-axis starting operations are possible

### Teaching Function

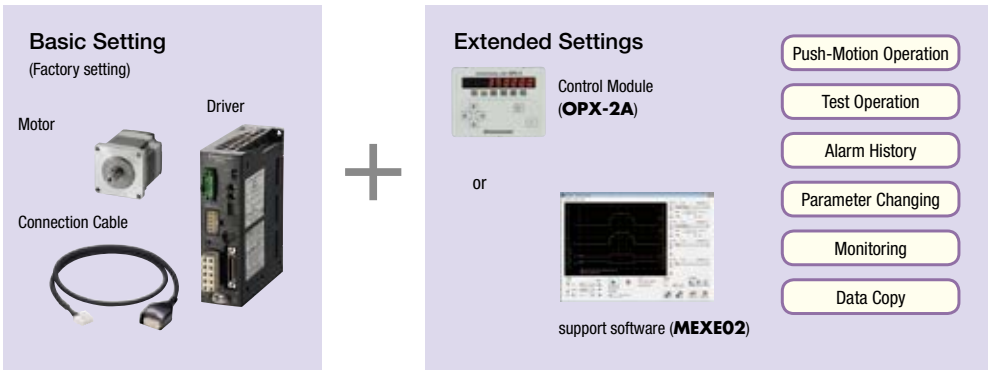
Teaching can be performed with the **OPX-2A** control module (sold separately) or the **MEXE02*** support software. The table is moved to the desired position, and the position data at that time is stored as the positioning data.

*The support software can be downloaded from the website. Please contact Oriental Motor for details.



## Pulse Input Type

The control module (sold separately) and support 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.<br>・1-pulse input mode (positive logic/negative logic)<br>・2-pulse input mode (positive logic/negative logic)<br>・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 the 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 stages) 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. | – | ● |
| | | Sets the damping control vibration frequency. | – | ● |
| | | Sets whether to enable or disable damping control. | – | ● |
| Selection of Motor Excitation Position at Power On | | The motor excitation position for when the power is on can be selected. | – | ● |
| Control Module Setting | | 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. | – | ● |

*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.

# Product Line of Motors

## Types and Features of Standard and Geared Motors

| Type | Features | Permissible Torque and Max. Instantaneous Torque [N·m (lb-in)] | Backlash [arcmin (degrees)] | Basic Resolution [deg/step] | Output Shaft Speed [r/min] |
|---|---|---|---|---|---|
| **Standard Type**  | · Basic motor of the **AR** Series | Maximum Holding Torque<br>4 (35) | —— | 0.36 | 4000 |
| Low Backlash<br>**TH** Geared Type (Spur Gear Mechanism)  | · A wide variety of low gear ratios, high-speed operations<br>· Gear ratio: 3.6, 7.2, 10, 20, 30 | Permissible Torque<br>12 (106) | 10 (0.17) | 0.012 | 500 |
| Low Backlash<br>**PS** Geared Type (Planetary Gear Mechanism)  | · High permissible torque/max. instantaneous torque<br>· A wide variety of gear ratios for selecting the desired step angle<br>· Center shaft<br>· Gear ratio: 5, 7.2, 10, 25, 36, 50 | Permissible Torque<br>37 (320)<br>Max. Instantaneous Torque<br>60 (530) | 7 (0.12) | 0.0072 | 600 |
| Non-Backlash<br>**PN** Geared Type (Planetary Gear Mechanism)  | · High speed (low gear ratio), high positioning accuracy<br>· High permissible torque/max. instantaneous torque<br>· A wide variety of gear ratios for selecting the desired step angle<br>· Center shaft<br>· Gear ratio: 5, 7.2, 10, 25, 36, 50 | Permissible Torque<br>37 (320)<br>Max. Instantaneous Torque<br>60 (530) | 2 (0.034) | 0.0072 | 600 |
| Non-Backlash<br>**Harmonic Geared Type** (Harmonic Drive)  | · High positioning accuracy<br>· High permissible torque/max. instantaneous torque<br>· High gear ratio, high resolution<br>· Center shaft<br>· Gear ratio: 50, 100 | Permissible Torque<br>37 (320)<br>Max. Instantaneous Torque<br>55 (480) | 0 | 0.0036 | 70 |

Note

- Please use the above values as reference to see the differences between each type. These values vary depending on the motor frame size and gear ratio.

## Power Supply Input and Frame Size

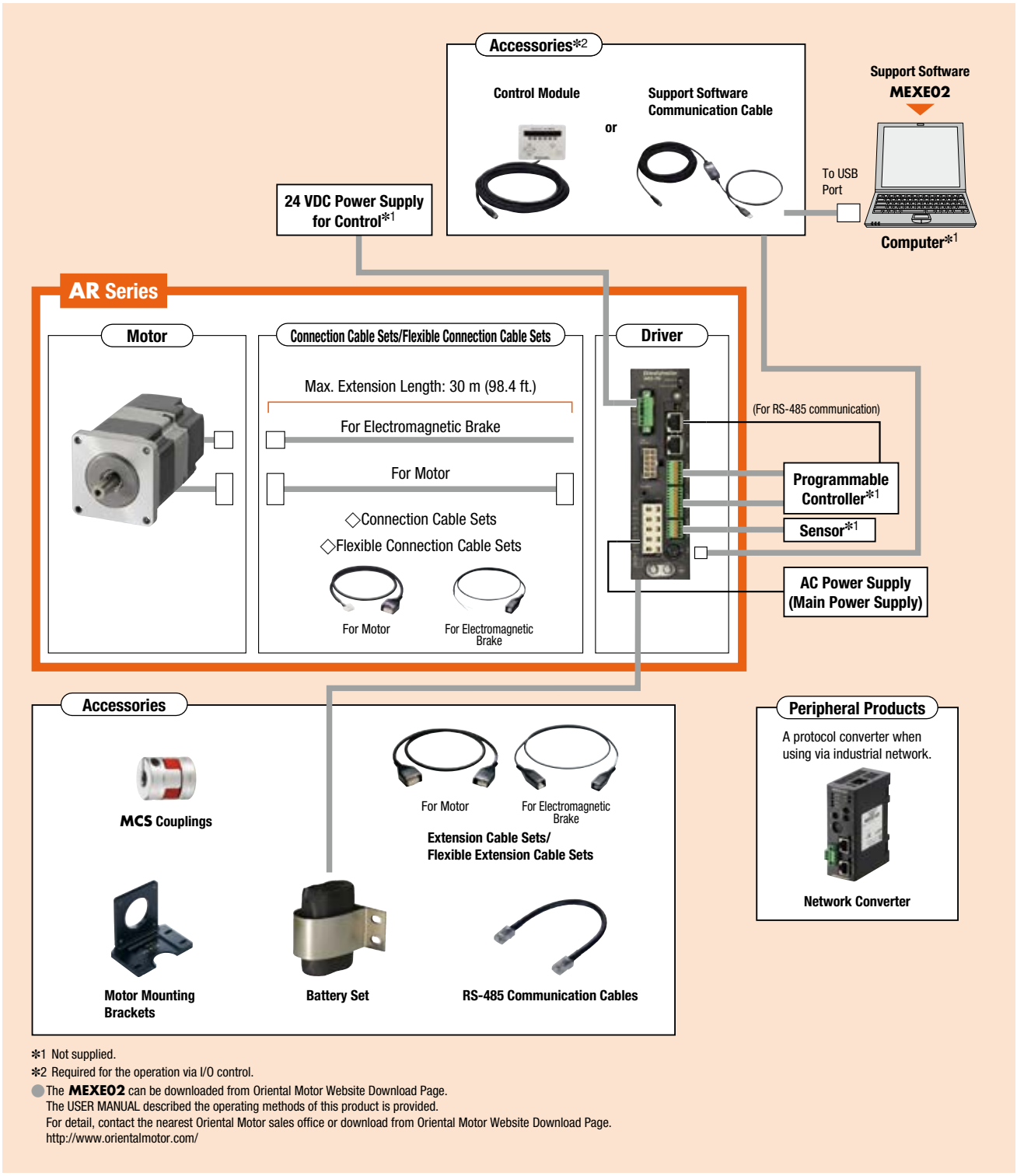
| Driver Type | Power Supply Input | Motor Type: Standard Type | Motor Type: **TH** Geared Type, **PS** Geared Type, **PN** Geared Type, Harmonic Geared Type |
|---|---|---|---|
| **Built-in Controller Type**  | Single-Phase 100-120 VAC<br>Single-Phase 200-240 VAC | □42 (□1.65)<br>□60 (□2.36)<br>□85 (□3.35) | □42 (□1.65)<br>□60 (□2.36)<br>□90 (□3.54) |
| **Pulse Input Type**  | Single-Phase 100-115 VAC<br>Single-Phase 200-230 VAC<br>Three-Phase 200-230 VAC | □42 (□1.65)<br>□60 (□2.36)<br>□85 (□3.35) | □42 (□1.65)<br>□60 (□2.36)<br>□90 (□3.54) |

- □42 (□1.65): Indicates a motor frame size of 42 mm (1.65 in.).
- Electromagnetic brake models are available for all types.

## System Configuration

### Built-in Controller Type - Standard Type with Electromagnetic Brake

An example of a configuration using I/O control or RS-485 communication is shown below.



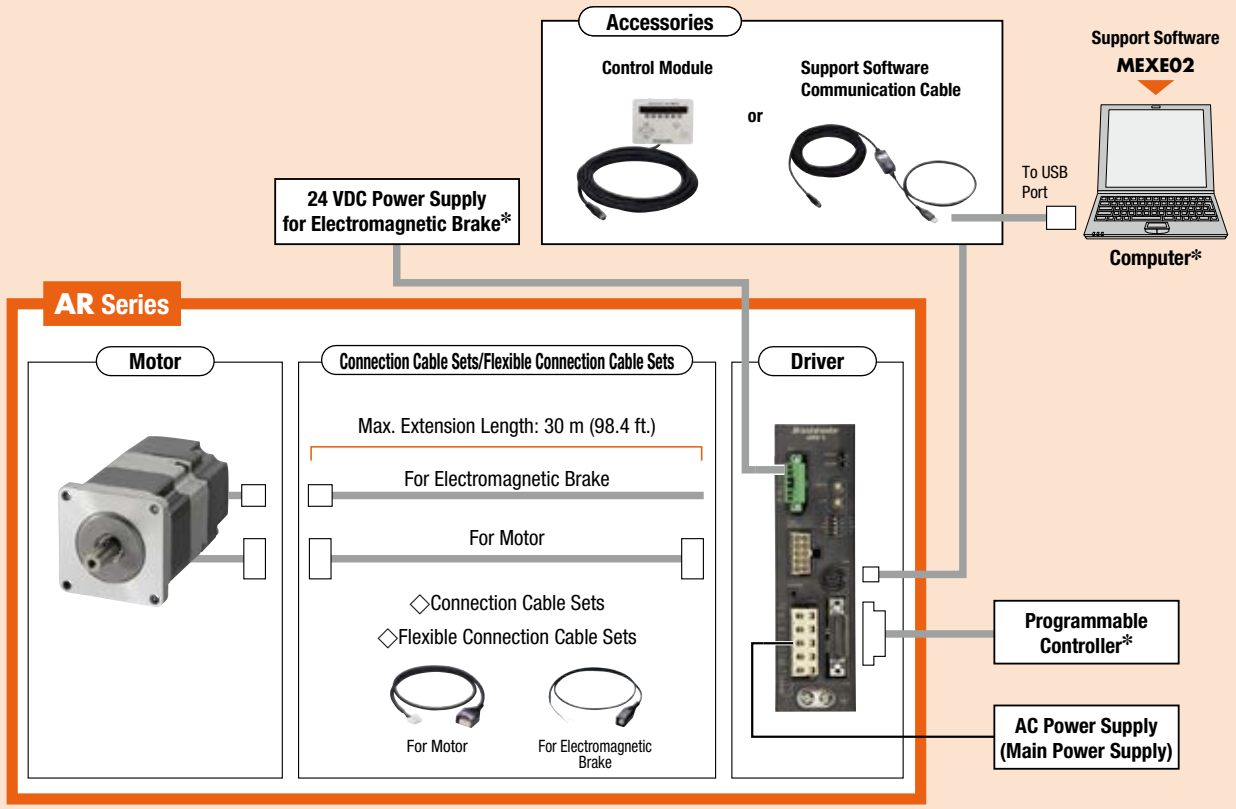

*1 Not supplied.
*2 Required for the operation via I/O control.

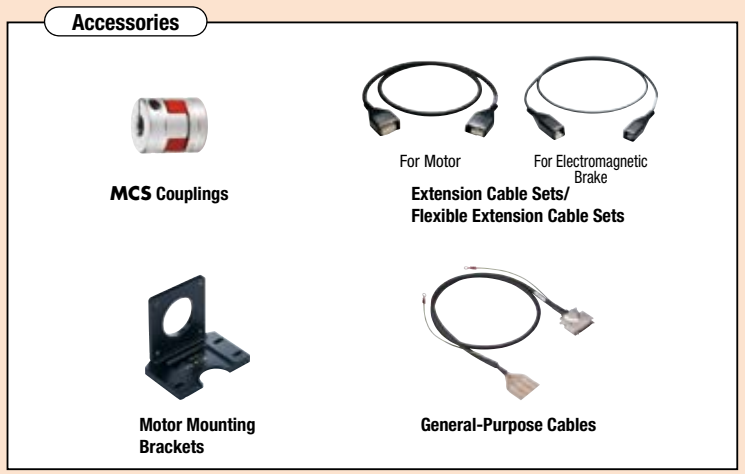
- The **MEXE02** can be downloaded from Oriental Motor Website Download Page.
  The USER MANUAL described the operating methods of this product is provided.
  For detail, contact the nearest Oriental Motor sales office or download from Oriental Motor Website Download Page.
  http://www.orientalmotor.com/

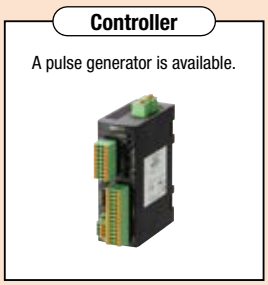
- The system configuration shown above is an example. Other combinations are also available.

## Pulse Input Type, Standard Type with Electromagnetic Brake

An example of a single-axis system configuration with the **SCX11** controller is shown below.




✻ Not supplied.

● The **MEXE02** can be downloaded from Oriental Motor Website Download Page.
The USER MANUAL described the operating methods of this product is provided.
For detail, contact the nearest Oriental Motor sales office or download from Oriental Motor Website Download Page.
http://www.orientalmotor.com/

● The system configuration shown above is an example. Other combinations are also available.

## Product Number

### Motor

◇Standard Type

**ARM 6 6 A C**

① ② ③ ④ ⑤

◇**TH**, **PS**, **PN**, Harmonic Geared Type

**ARM 6 6 A C - N 5**

① ② ③ ④ ⑤ ⑥ ⑦

| | | |
|---|---|---|
| ① | Motor Type | **ARM**: **AR** Series Motor |
| ② | Motor Frame Size | **4**: 42 mm (1.65 in.) **6**: 60 mm (2.36 in.)<br>**9**: 85 mm (3.35 in.) [90 mm (3.54 in.)]<br>[] is the gearhead frame size. |
| ③ | Motor Case Length | |
| ④ | Configuration | **A**: Single Shaft<br>**B**: Double Shaft<br>**M**: With Electromagnetic Brake |
| ⑤ | Motor Specification | **C**: AC Power Supply Input Specifications |
| ⑥ | Geared Type | **T**: **TH** Geared Type<br>**PS**: **PS** Geared Type<br>**N**: **PN** Geared Type<br>**H**: Harmonic Geared Type |
| ⑦ | Gear Ratio | |

### Driver

**ARD - C D**

① ② ③

| | | |
|---|---|---|
| ① | Driver Type | **ARD**: **AR** Series Driver |
| ② | Power Supply Input | Built-in Controller Type<br>**A**: Single-Phase 100-120 VAC<br>**C**: Single-Phase 200-240 VAC<br>Pulse Input Type<br>**A**: Single-Phase 100-115 VAC<br>**C**: Single-Phase 200-230 VAC<br>**S**: Three-Phase 200-230 VAC |
| ③ | Type | **D**: Built-in Controller Type<br>Blank: Pulse Input Type |

### Connection Cable Sets/Flexible Connection Cable Sets

**CC 050 V A F B**

① ② ③ ④ ⑤ ⑥

| | | |
|---|---|---|
| ① | | **CC**: Cable |
| ② | Length | **010**: 1 m (3.3 ft.) **020**: 2 m (6.6 ft.) **030**: 3 m (9.8 ft.)<br>**050**: 5 m (16.4 ft.) **070**: 7 m (23.0 ft.) **100**: 10 m (32.8 ft.)<br>**150**: 15 m (49.2 ft.) **200**: 20 m (65.6 ft.) **300**: 30 m (98.4 ft.) |
| ③ | Reference Number | |
| ④ | Applicable Product | **A**: **AR** Series |
| ⑤ | Cable Type | **F**: Connection Cable Sets<br>**R**: Flexible Connection Cable Sets |
| ⑥ | Electromagnetic Brake | Blank: Without Electromagnetic Brake<br>**B**: With Electromagnetic Brake |

# Product Line

### ◇Standard Type

| Product Name (Single shaft) | List Price | Product Name (Double shaft) | List Price |
|---|---|---|---|
| **ARM46AC** | $137.00 | **ARM46BC** | $140.00 |
| **ARM66AC** | $192.00 | **ARM66BC** | $194.00 |
| **ARM69AC** | $214.00 | **ARM69BC** | $217.00 |
| **ARM98AC** | $257.00 | **ARM98BC** | $260.00 |
| **ARM911AC** | $325.00 | **ARM911BC** | $329.00 |

### ◇Standard Type with Electromagnetic Brake

| Product Name | List Price |
|---|---|
| **ARM46MC** | $330.00 |
| **ARM66MC** | $385.00 |
| **ARM69MC** | $408.00 |
| **ARM98MC** | $450.00 |

### ◇**TH** Geared Type

| Product Name | List Price |
|---|---|
| **ARM46AC-T3.6** | $243.00 |
| **ARM46AC-T7.2** | $243.00 |
| **ARM46AC-T10** | $256.00 |
| **ARM46AC-T20** | $256.00 |
| **ARM46AC-T30** | $256.00 |
| **ARM66AC-T3.6** | $311.00 |
| **ARM66AC-T7.2** | $311.00 |
| **ARM66AC-T10** | $323.00 |
| **ARM66AC-T20** | $323.00 |
| **ARM66AC-T30** | $323.00 |
| **ARM98AC-T3.6** | $402.00 |
| **ARM98AC-T7.2** | $402.00 |
| **ARM98AC-T10** | $415.00 |
| **ARM98AC-T20** | $415.00 |
| **ARM98AC-T30** | $415.00 |

### ◇**TH** Geared Type with Electromagnetic Brake

| Product Name | List Price |
|---|---|
| **ARM46MC-T3.6** | $437.00 |
| **ARM46MC-T7.2** | $437.00 |
| **ARM46MC-T10** | $449.00 |
| **ARM46MC-T20** | $449.00 |
| **ARM46MC-T30** | $449.00 |
| **ARM66MC-T3.6** | $504.00 |
| **ARM66MC-T7.2** | $504.00 |
| **ARM66MC-T10** | $517.00 |
| **ARM66MC-T20** | $517.00 |
| **ARM66MC-T30** | $517.00 |
| **ARM98MC-T3.6** | $596.00 |
| **ARM98MC-T7.2** | $596.00 |
| **ARM98MC-T10** | $608.00 |
| **ARM98MC-T20** | $608.00 |
| **ARM98MC-T30** | $608.00 |

### ◇**PS** Geared Type

| Product Name | List Price |
|---|---|
| **ARM46AC-PS5** | $344.00 |
| **ARM46AC-PS7** | $344.00 |
| **ARM46AC-PS10** | $344.00 |
| **ARM46AC-PS25** | $389.00 |
| **ARM46AC-PS36** | $389.00 |
| **ARM46AC-PS50** | $389.00 |
| **ARM66AC-PS5** | $444.00 |
| **ARM66AC-PS7** | $444.00 |
| **ARM66AC-PS10** | $444.00 |
| **ARM66AC-PS25** | $507.00 |
| **ARM66AC-PS36** | $507.00 |
| **ARM66AC-PS50** | $507.00 |
| **ARM98AC-PS5** | $572.00 |
| **ARM98AC-PS7** | $572.00 |
| **ARM98AC-PS10** | $572.00 |
| **ARM98AC-PS25** | $680.00 |
| **ARM98AC-PS36** | $680.00 |
| **ARM98AC-PS50** | $680.00 |

### ◇**PS** Geared Type with Electromagnetic Brake

| Product Name | List Price |
|---|---|
| **ARM46MC-PS5** | $537.00 |
| **ARM46MC-PS7** | $537.00 |
| **ARM46MC-PS10** | $537.00 |
| **ARM46MC-PS25** | $582.00 |
| **ARM46MC-PS36** | $582.00 |
| **ARM46MC-PS50** | $582.00 |
| **ARM66MC-PS5** | $637.00 |
| **ARM66MC-PS7** | $637.00 |
| **ARM66MC-PS10** | $637.00 |
| **ARM66MC-PS25** | $700.00 |
| **ARM66MC-PS36** | $700.00 |
| **ARM66MC-PS50** | $700.00 |
| **ARM98MC-PS5** | $765.00 |
| **ARM98MC-PS7** | $765.00 |
| **ARM98MC-PS10** | $765.00 |
| **ARM98MC-PS25** | $873.00 |
| **ARM98MC-PS36** | $873.00 |
| **ARM98MC-PS50** | $873.00 |

### ◇PN Geared Type

| Product Name | List Price |
|---|---|
| **ARM46AC-N5** | $425.00 |
| **ARM46AC-N7.2** | $425.00 |
| **ARM46AC-N10** | $425.00 |
| **ARM66AC-N5** | $624.00 |
| **ARM66AC-N7.2** | $624.00 |
| **ARM66AC-N10** | $624.00 |
| **ARM66AC-N25** | $756.00 |
| **ARM66AC-N36** | $756.00 |
| **ARM66AC-N50** | $756.00 |
| **ARM98AC-N5** | $916.00 |
| **ARM98AC-N7.2** | $916.00 |
| **ARM98AC-N10** | $916.00 |
| **ARM98AC-N25** | $1,016.00 |
| **ARM98AC-N36** | $1,016.00 |
| **ARM98AC-N50** | $1,016.00 |

### ◇Harmonic Geared Type

| Product Name | List Price |
|---|---|
| **ARM46AC-H50** | $609.00 |
| **ARM46AC-H100** | $609.00 |
| **ARM66AC-H50** | $894.00 |
| **ARM66AC-H100** | $894.00 |
| **ARM98AC-H50** | $1,274.00 |
| **ARM98AC-H100** | $1,274.00 |

### ◇PN Geared Type with Electromagnetic Brake

| Product Name | List Price |
|---|---|
| **ARM46MC-N5** | $618.00 |
| **ARM46MC-N7.2** | $618.00 |
| **ARM46MC-N10** | $618.00 |
| **ARM66MC-N5** | $817.00 |
| **ARM66MC-N7.2** | $817.00 |
| **ARM66MC-N10** | $817.00 |
| **ARM66MC-N25** | $950.00 |
| **ARM66MC-N36** | $950.00 |
| **ARM66MC-N50** | $950.00 |
| **ARM98MC-N5** | $1,110.00 |
| **ARM98MC-N7.2** | $1,110.00 |
| **ARM98MC-N10** | $1,110.00 |
| **ARM98MC-N25** | $1,210.00 |
| **ARM98MC-N36** | $1,210.00 |
| **ARM98MC-N50** | $1,210.00 |

### ◇Harmonic Geared Type with Electromagnetic Brake

| Product Name | List Price |
|---|---|
| **ARM46MC-H50** | $803.00 |
| **ARM46MC-H100** | $803.00 |
| **ARM66MC-H50** | $1,087.00 |
| **ARM66MC-H100** | $1,087.00 |
| **ARM98MC-H50** | $1,467.00 |
| **ARM98MC-H100** | $1,467.00 |

## ●Driver

### ◇Built-in Controller Type

| Power Supply Input | Product Name | List Price |
|---|---|---|
| Single-Phase 100-120 VAC | **ARD-AD** | $590.00 |
| Single-Phase 200-240 VAC | **ARD-CD** | $590.00 |

### ◇Pulse Input Type

| Power Supply Input | Product Name | List Price |
|---|---|---|
| Single-Phase 100-115 VAC | **ARD-A** | $590.00 |
| Single-Phase 200-230 VAC | **ARD-C** | $590.00 |
| Three-Phase 200-230 VAC | **ARD-S** | $590.00 |

## ●Connection Cable Sets/Flexible Connection Cable Sets

Use a flexible connection cable set if the cable will be bent. Extension cables and flexible extension cables that can extend the connection cables are available.

Cable for Motor

### ◇For Motor

| Type | Length m (ft.) | Product Name | List Price |
|---|---|---|---|
| Connection Cable Sets | 1 (3.3) | **CC010VAF** | $61.00 |
| | 2 (6.6) | **CC020VAF** | $74.00 |
| | 3 (9.8) | **CC030VAF** | $88.00 |
| | 5 (16.4) | **CC050VAF** | $114.00 |
| | 7 (23.0) | **CC070VAF** | $140.00 |
| | 10 (32.8) | **CC100VAF** | $180.00 |
| | 15 (49.2) | **CC150VAF** | $246.00 |
| | 20 (65.6) | **CC200VAF** | $312.00 |
| | 30 (98.4) | **CC300VAF** | $444.00 |
| Flexible Connection Cable Sets | 1 (3.3) | **CC010VAR** | $100.00 |
| | 2 (6.6) | **CC020VAR** | $136.00 |
| | 3 (9.8) | **CC030VAR** | $172.00 |
| | 5 (16.4) | **CC050VAR** | $244.00 |
| | 7 (23.0) | **CC070VAR** | $316.00 |
| | 10 (32.8) | **CC100VAR** | $424.00 |
| | 15 (49.2) | **CC150VAR** | $604.00 |
| | 20 (65.6) | **CC200VAR** | $784.00 |
| | 30 (98.4) | **CC300VAR** | $1,144.00 |

Cable for Motor

Cable for Electromagnetic Brake

### ◇For Motor/Electromagnetic Brake

| Type | Length m (ft.) | Product Name | List Price |
|---|---|---|---|
| Connection Cable Sets | 1 (3.3) | **CC010VAFB** | $80.00 |
| | 2 (6.6) | **CC020VAFB** | $96.00 |
| | 3 (9.8) | **CC030VAFB** | $112.00 |
| | 5 (16.4) | **CC050VAFB** | $143.00 |
| | 7 (23.0) | **CC070VAFB** | $174.00 |
| | 10 (32.8) | **CC100VAFB** | $221.00 |
| | 15 (49.2) | **CC150VAFB** | $299.00 |
| | 20 (65.6) | **CC200VAFB** | $377.00 |
| | 30 (98.4) | **CC300VAFB** | $533.00 |
| Flexible Connection Cable Sets | 1 (3.3) | **CC010VARB** | $122.00 |
| | 2 (6.6) | **CC020VARB** | $164.00 |
| | 3 (9.8) | **CC030VARB** | $206.00 |
| | 5 (16.4) | **CC050VARB** | $290.00 |
| | 7 (23.0) | **CC070VARB** | $374.00 |
| | 10 (32.8) | **CC100VARB** | $500.00 |
| | 15 (49.2) | **CC150VARB** | $710.00 |
| | 20 (65.6) | **CC200VARB** | $920.00 |
| | 30 (98.4) | **CC300VARB** | $1,340.00 |

## Included

### Motor

| Type | Included | Parallel Key | Operating Manual |
|---|---|---|---|
| Standard Type | | – | 1 Copy |
| **TH** Geared Type | Frame Size 42 mm (1.65 in.) | – | |
| | Frame Size 60 mm (2.36 in.) | – | |
| | Frame Size 90 mm (3.54 in.) | 1 piece | |
| **PS** Geared Type | | 1 piece | |
| **PN** Geared Type | | 1 piece | |
| Harmonic Geared Type | | 1 piece | |

### Driver

| Type | Included | Connector | Operating Manual |
|---|---|---|---|
| Built-in Controller Type | | ・CN1 Connector (1 piece)<br>・CN3 Connector (1 piece)<br>・CN5 Connector (1 piece)<br>・Connector Wiring Lever (1 piece)<br>・CN8 Connector (1 piece)<br>・CN9 Connector (1 piece) | 1 Copy |
| Pulse Input Type | | ・CN1 Connector (1 piece)<br>・CN3 Connector (1 piece)<br>・CN5 Connector (1 piece)<br>・Connector Wiring Lever (1 piece) | 1 Copy |

### Connection Cable Sets/Flexible Connection Cable Sets

| Type | Included | Operating Manual |
|---|---|---|
| Connection Cable Sets | | – |
| Flexible Connection Cable Sets | | 1 Copy |

Overview
αSTEP Absolute AZ
Linear Slides αSTEP EZS
Cylinders αSTEP EAC
Cylinders αSTEP DRS2
Rotary Actuators αSTEP DGII
αSTEP AR

For details (specifications, characteristics, dimensions and more) on these products, please either refer to our website or contact technical support or your nearest Oriental Motor sales office.
www.orientalmotor.com

# Hybrid Control System αSTEP
# AR Series DC Input

CE

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


Built-in Controller Type　　Pulse Input Type

Stepper motor based hybrid motors utilize a unique control system combining the benefits of "open loop control" and "closed loop control". During normal conditions, these motors provide high response through synchronous operation with commands using open loop control. In an overload situation, the motor position is corrected with the closed loop control and operation is maintained. These are motors that are both easy to use and highly reliable.

- 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

**See Full Product Details Online**
**www.orientalmotor.com**

● Manual　● Specifications　● Dimensions
● CAD　● Characteristics　● Connection and Operation

## Features

### High Reliability with Closed Loop Control

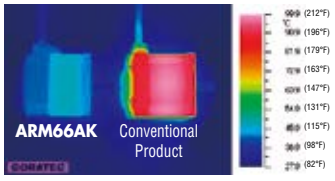
For details, refer to "Overview of Hybrid Control System αSTEP" on page B-3.

### Continuous Operation Utilizing High-Efficiency Technology

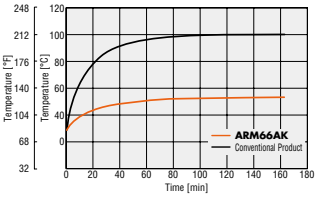
#### ●Lower Heat Generation

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

● Temperature Distribution by Thermography



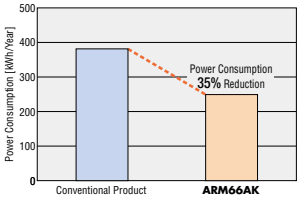

● Motor Case Temperature under Same Operating Conditions




Comparison under the Same Conditions.

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

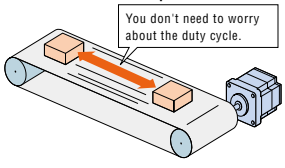
● Power Consumption




✻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)
- Power Supply Voltage: 24 VDC

#### ●Continuous Operation (Operation at a High Duty Cycle)

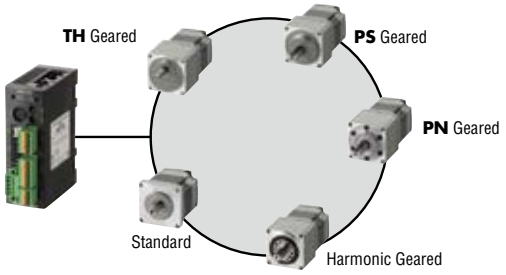
The **AR** Series can be operated at high frequency.
The motor can operate continuously.




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 (3.94×3.94 in.), 6 mm (0.24 in.) thick is required.

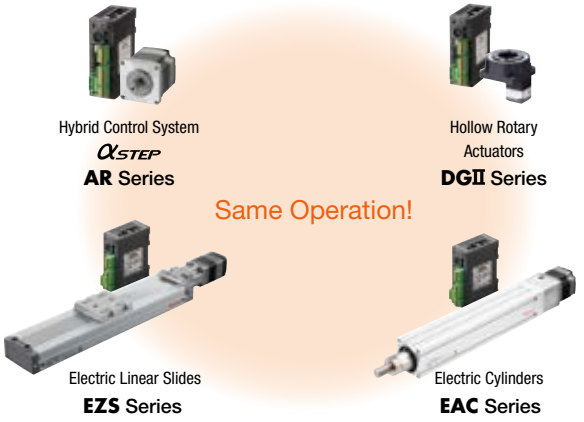
### A Single Driver to Support a Variety of Motors

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 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.

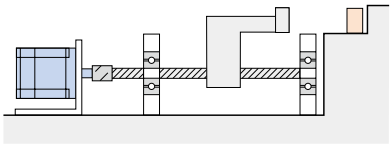

● Built-in Controller Type ● Pulse Input Type

### 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.

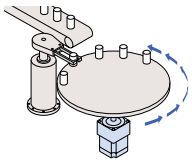
Note

- Push-motion operation requires a data module **OPX-2A** (sold separately) or support 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 wrap 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.)



✻When building an absolute system, the accessory battery is necessary (sold separately).

### Also Supports Absolute Systems

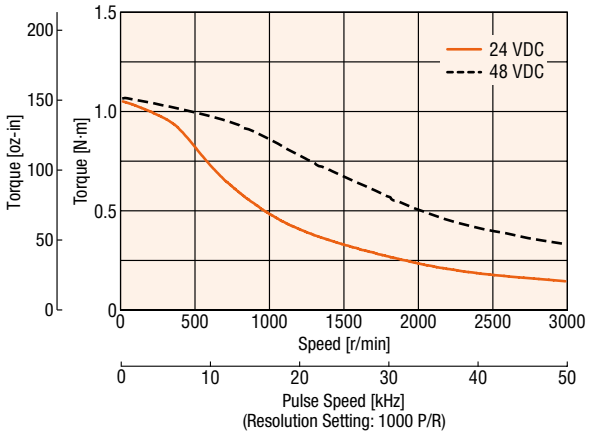
You can build an absolute system that detects absolute positions by connecting the accessory battery (sold separately). (Available only on the built-in controller type.)

● Battery Set (Sold separately)

### 48 VDC Compatible

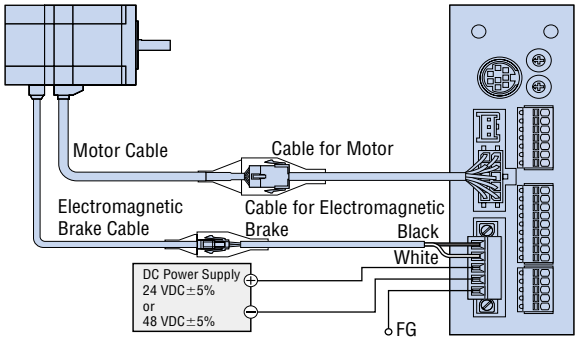
The motor runs on a 24 VDC or 48 VDC power supply. Choose the power supply that you have available. The torque is higher when 48 VDC is used rather than 24 VDC. [Frame size 28 mm (1.10 in.) only accepts 24 VDC input.]

**ARM66AK**




### Automatically Controlled Electromagnetic Brake

For built-in controller types, customers do not need to 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 (98.4 ft.) Wiring Distance Between Motor and Driver

A connection cable can be used to extend the wiring distance up to 30 m (98.4 ft.). Extension cables and flexible extension cables are available as accessories (sold separately).

### Motor Protection Degree: IP65✻

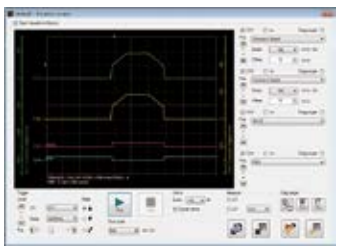
The motor complies with the requirements of protection degree IP65✻ (except for the motor installation surface and connectors). This means that the enclosure prevents intrusion of dust that can otherwise inhibit normal operation.

✻For **ARM24**, **ARM26**, and double shaft products, the degree of protection is IP20

## Easy Setting and Easy Monitoring

By using the **MEXE02** support 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.

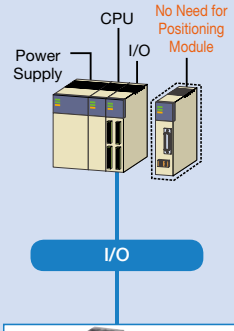
# 2 Driver Types Available Depending on the System Configuration

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

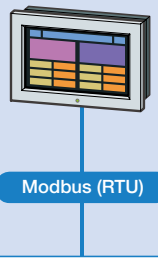


## ●Built-in Controller Type FLEX

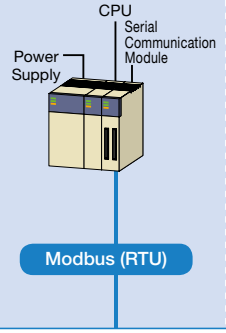
① When Controlling with I/O



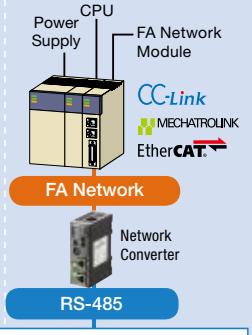

② When Controlling from Computer or Touch Screen (HMI)




② When Controlling with Serial Communication




③ When Controlling with FA Network

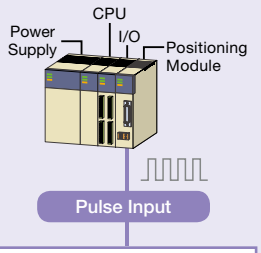



Because the driver stores the information necessary for motor operation, the burden on the host PLC is reduced.
This simplifies the system configuration for multi-axis control. Settings can be configured using support software or RS-485 communications.

EtherCAT. is a registered trademark for which a license is provided by Beckhoff Automation GmbH in Germany.

CC-Link is a registered trademark of CC-Link Partner Association and MECHATROLINK is a registered trademark of MECHATROLINK Members Association.

## ●Pulse Input Type



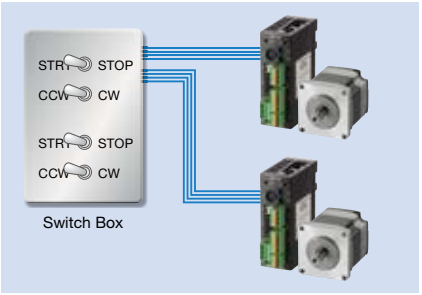

This type executes operations by inputting pulses into the driver. It controls the motor using a positioning module (pulse generator).

## ●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.

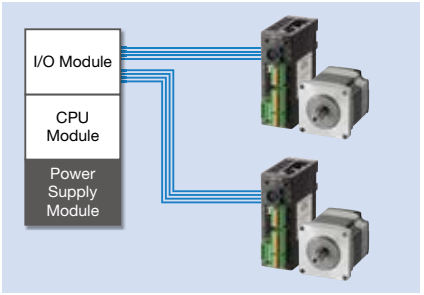
●Example of Using a Switch Box




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

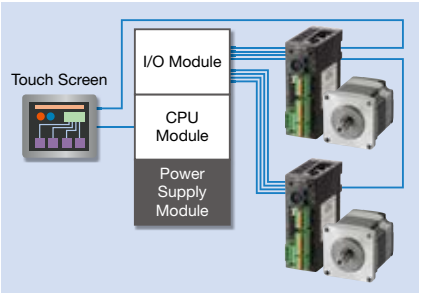
●Example of Using PLC




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 motors to be started simultaneously. The Modbus (RTU) protocol is supported and can be used to connect to touch screens and computers.

Easy Control | Simple Wiring | Supports Brands of Serial Module | Motor Controlled by Computer | Simplified System

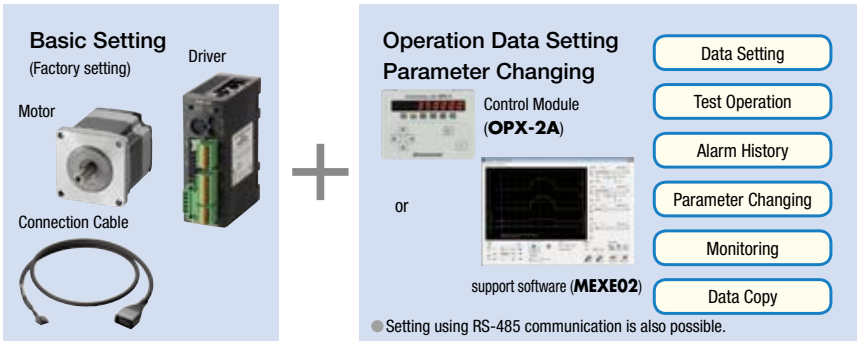
### ③ Control via FA Network

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 FLEX

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), support 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.

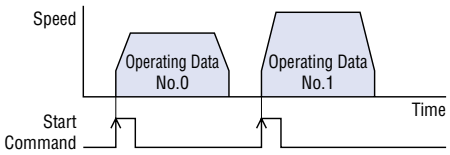
| Item | | Description | |
|---|---|---|---|
| Common | Control Method | I/O control | |
| | | RS-485 Communication | Network Converter Connection |
| | | | Modbus RTU Protocol Connection |
| | Position Command Input | Setting with operating data number Command range for each point: −8388608～8388607 [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.<br>The acceleration/deceleration rate [ms/kHz] or acceleration/deceleration time [s] can be selected.<br>Command Range: 0.001～1000.000 [ms/kHz] (Setting unit: 0.001 [ms/kHz])<br>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.<br>The timer (dwell time) can be set from 0～50.000 [s].<br>(Setting unit: 0.001 [s]) |
| | | Push-Motion Operation*1 | Continuous pressurizing position operations are performed with respect to the load.<br>Maximum speed of operation is 500 [r/min] on the motor shaft. |
| | Start Methods | Operating Data Selection Method | Starts the positioning operation when START is input after selecting M0～M5. |
| | | Direct Method<br>(Direct positioning) | Starts the positioning operation with the operating data number set in the parameters when MS0～MS5 is input. |
| | | Sequential Method<br>(Sequential positioning) | Starts the positioning operation in sequence from operating data No. 0 each time SSTART is input. |
| Continuous Operation | Number of Speed Points | 64 points (No. 0～63) | |
| | Speed Change Method | Changes the operating data number. | |
| Other Operations | 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. | |
| Absolute Backup | | You can build an absolute system by using a battery (accessory). | |

*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.

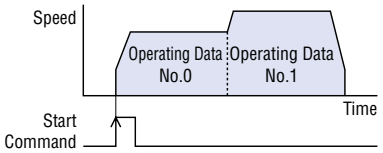
## Positioning Operation

<Operation Functions>

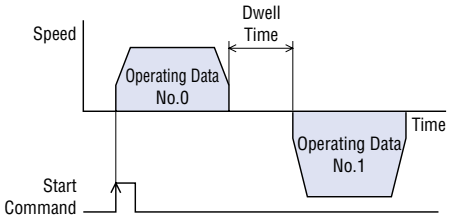
- Independent Operation



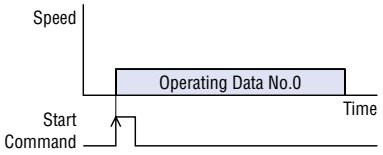

- Linked Operation




- Linked Operation 2




- Push-Motion Operation

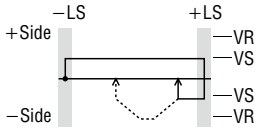



<Start Methods>

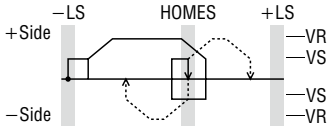
- Operating Data Selection Method
- Direct Positioning
- Sequential Positioning

## Return-To-Home Operation

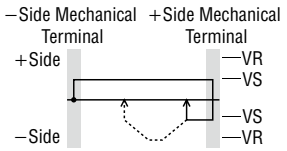
- 2-Sensor Mode




- 3-Sensor Mode

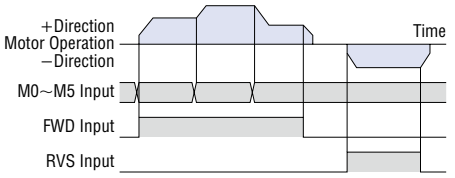



- Pushing Mode




- Position Preset

## Continuous Operation




## Other Operations

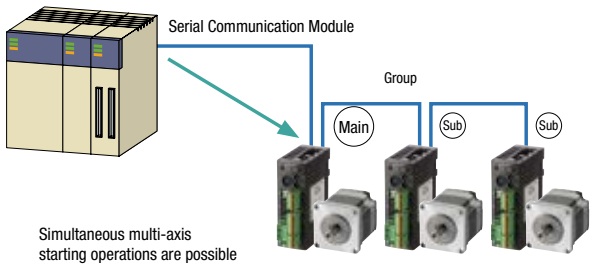
- JOG Operation (Test operation)
- Automatic Return Operation
  - Equipped with a sequence for return-to-home operation that reduces the burden of the host master and the hassle of creating a ladder.

### Group Send Function

Modbus (RTU) communication and FA network have a function that enables multiple motors 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

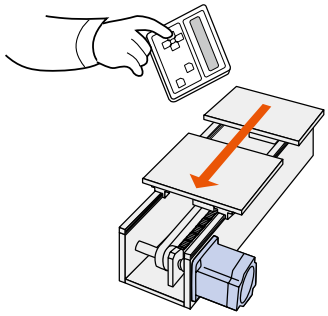
- Example of Modbus (RTU) Communication Control




### Teaching Function

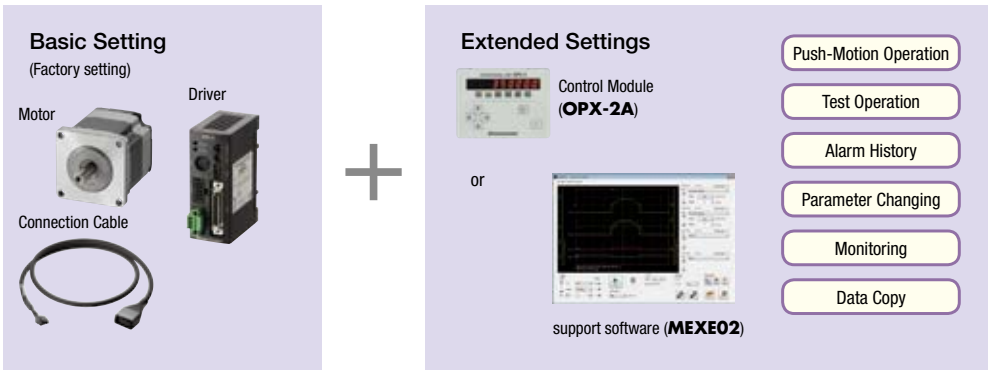
Teaching can be performed with the **OPX-2A** control module (sold separately) or the **MEXE02*** support software. The table is moved to the desired position, and the position data at that time is stored as the positioning data.

*The support software can be downloaded from the website. Please contact us for details.



## Pulse Input Type

The control module (sold separately) and support 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.<br>・1-pulse input mode (positive logic/negative logic)<br>・2-pulse input mode (positive logic/negative logic)<br>・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 the 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. | – | ● |
| | | Sets the damping control vibration frequency. | – | ● |
| | | Sets whether to enable or disable damping control. | – | ● |
| Selection of Motor Excitation Position at Power On | | The motor excitation position for when the power is on can be selected. | – | ● |
| Control Module Setting | | 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. | – | ● |

*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.

# Product Line of Motors

## Types and Features of Standard and Geared Motors

| Type | Features | Gear Ratio | Permissible Torque/Max. Instantaneous Torque [N·m (lb-in)] | Backlash [arcmin (degrees)] | Basic Resolution [deg/step] | Output Shaft Speed [r/min] |
|---|---|---|---|---|---|---|
| **Standard**  | · Basic motor of the **AR** Series. | —— | Maximum Holding Torque 2 (17.7) | —— | 0.36 | 4000 |
| Low backlash: **TH** Geared Type (Spur Gear Mechanism)  | · High Speed (Low gear ratio) | 3.6, 7.2, 10, 20, 30 (A lineup of gear ratios for selecting the desired step angle) | Permissible Torque 12 (106) | 10 (0.17) | 0.012 | 500 |
| Low backlash: **PS** Geared Type (Planetary Gear Mechanism)  | · High Speed (Low gear ratio)<br>· High Permissible Torque<br>· High Maximum Instantaneous Torque<br>· Center Shaft | 5, 7.2, 10, 25, 36, 50 (A lineup of gear ratios for selecting the desired step angle) | Permissible Torque 37 (320) Max. Instantaneous Torque 60 (530) | 7 (0.12) | 0.0072 | 600 |
| Non-backlash: **PN** Geared Type (Planetary Gear Mechanism)  | · High Speed (Low gear ratio)<br>· High Positioning Accuracy<br>· High Permissible Torque<br>· High Maximum Instantaneous Torque<br>· Center Shaft | 5, 7.2, 10, 25, 36, 50 (A lineup of gear ratios for selecting the desired step angle) | Permissible Torque 37 (320) Max. Instantaneous Torque 60 (530) | 2 (0.034) | 0.0072 | 600 |
| Non-backlash: **Harmonic Geared Type** (Harmonic Drive)  | · High Resolution (High gear ratio)<br>· High Positioning Accuracy<br>· High Permissible Torque<br>· High Maximum Instantaneous Torque<br>· Center Shaft | 50, 100 | Permissible Torque 37 (320) Max. Instantaneous Torque 55 (480) | 0 | 0.0036 | 70 |

Note

● Please use the above values as reference to see the differences between each type. These values vary depending on the motor frame size and gear ratio.

## Frame Sizes

5 motor frame sizes are available for the built-in controller type and for the pulse input type.

[□42 (□1.65): Indicates a motor frame size of 42 mm (1.65 in.)]

| Motor Type | | □28 (□1.10) [□30 (□1.18)*1] | □42 (□1.65) | □60 (□2.36) | □85 (□3.35) [□90 (□3.54)*2] |
|---|---|---|---|---|---|
| Standard Type | Without Electromagnetic Brake | ● | ● | ● | ● |
| | Electromagnetic Brake Type | | ● | ● | ● |
| **TH**, **PS**, **PN**, Harmonic Geared Type | Without Electromagnetic Brake | ● | ● | ● | ● |
| | Electromagnetic Brake Type | | ● | ● | ● |

*1 Harmonic geared type

*2 Geared type

## Conforms to Various Directives

### ◇Components Conforming to International Safety Standards

UL Standards certified

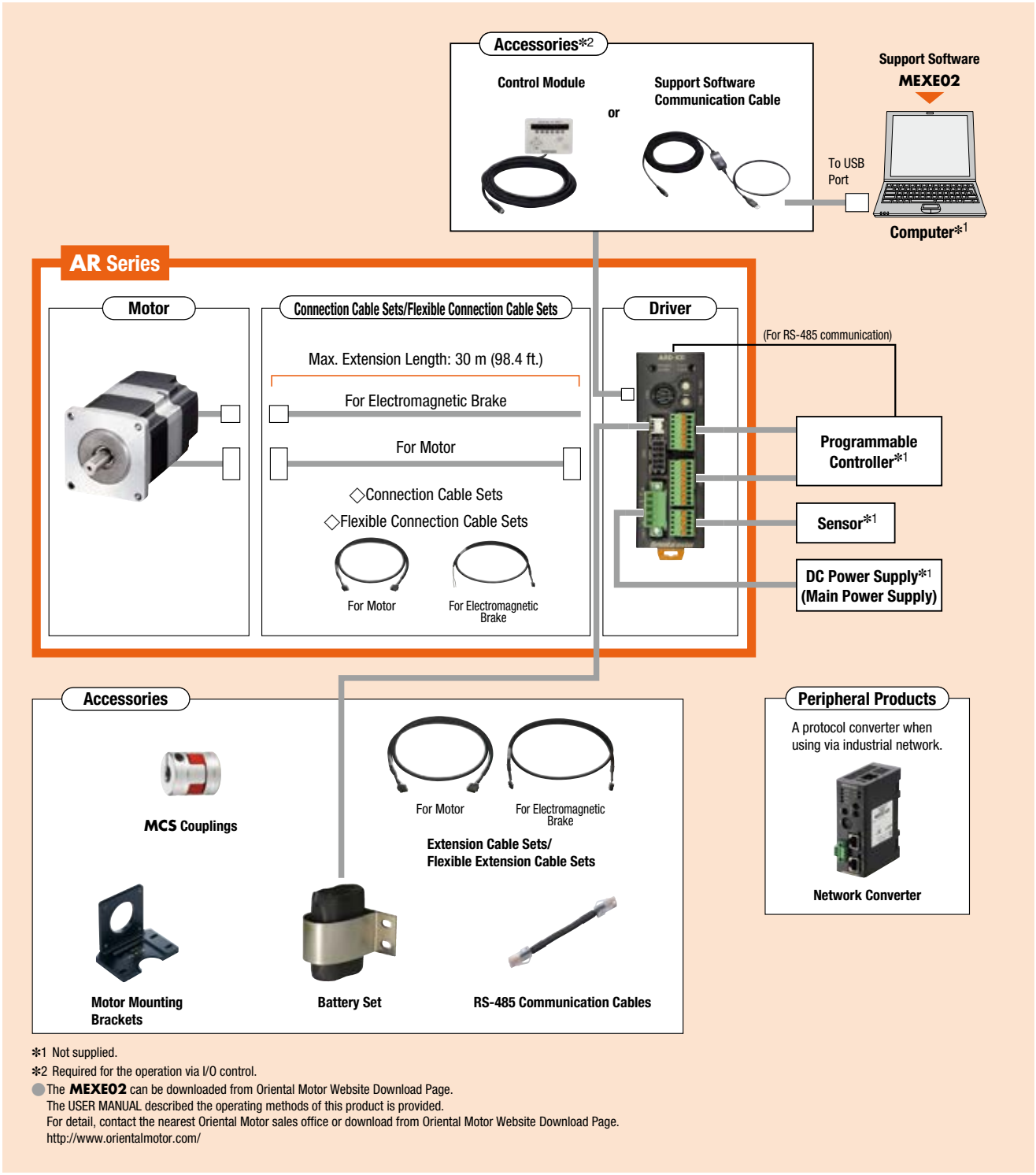
[Except for motor frame size of 28 mm (1.10 in.)]

This product has a CE Marking (EMC Directive) affixed under the Low Voltage Directive.

## System Configuration

### Built-in Controller Type, Standard Type with Electromagnetic Brake

An example of a configuration using I/O control or RS-485 communication is shown below.




*1 Not supplied.

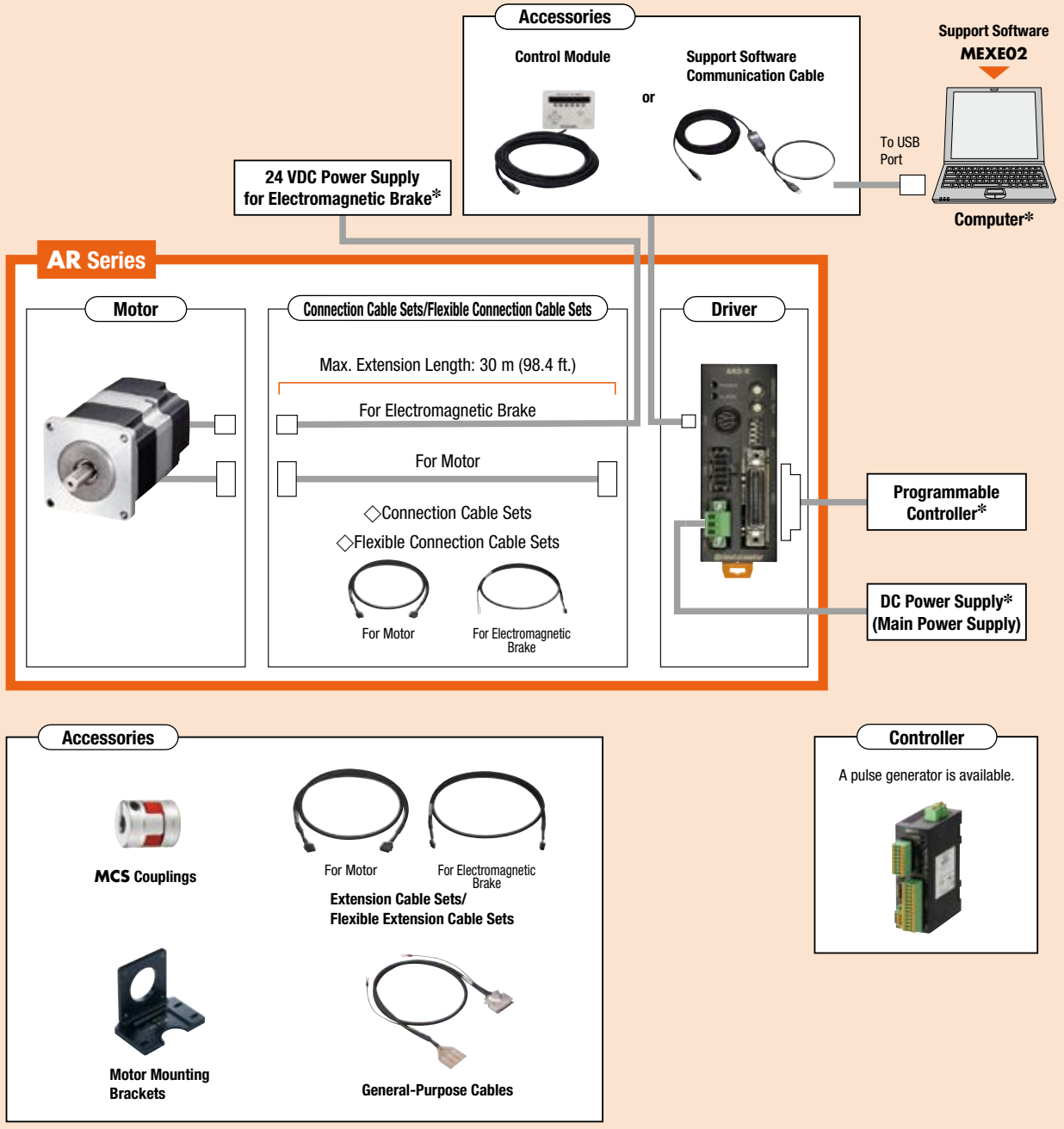
*2 Required for the operation via I/O control.

● The **MEXE02** can be downloaded from Oriental Motor Website Download Page.
The USER MANUAL described the operating methods of this product is provided.
For detail, contact the nearest Oriental Motor sales office or download from Oriental Motor Website Download Page.
http://www.orientalmotor.com/

● The system configuration shown above is an example. Other combinations are also available.

## ●Pulse Input Type, Standard Type with Electromagnetic Brake

An example of a single-axis system configuration with the **SCX11** controller is shown below.




* Not supplied.

● The **MEXE02** can be downloaded from Oriental Motor Website Download Page.
The USER MANUAL described the operating methods of this product is provided.
For detail, contact the nearest Oriental Motor sales office or download from Oriental Motor Website Download Page.
http://www.orientalmotor.com/

● The system configuration shown above is an example. Other combinations are also available.

## Product Number

### Motor

◇Standard Type

**ARM 2 4 S A K**

① ② ③ ④ ⑤ ⑥

◇**TH**, **PS**, **PN**, Harmonic Geared Type

**ARM 2 4 S A K - PS 10**

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

| | | |
|---|---|---|
| ① | Motor Type | **ARM**: **AR** Series Motor |
| ② | Motor Frame Size | **2**: 28 mm (1.10 in.) [30 mm (1.18 in.)]<br>**4**: 42 mm (1.65 in.) **6**: 60 mm (2.36 in.)<br>**9**: 85 mm (3.35 in.) [90 mm (3.54 in.)]<br>[] is the gearhead frame size. |
| ③ | Motor Case Length | |
| ④ | Motor Classification | |
| ⑤ | Configuration | **A**: Single Shaft<br>**B**: Double Shaft<br>**M**: With Electromagnetic Brake |
| ⑥ | Motor Specification | **K**: DC Power Supply Input |
| ⑦ | Geared Type | **T**: **TH** Geared Type<br>**PS**: **PS** Geared Type<br>**N**: **PN** Geared Type<br>**H**: Harmonic Geared Type |
| ⑧ | Gear Ratio | |

### Driver

**ARD - K D**

① ② ③

| | | |
|---|---|---|
| ① | Driver Type | **ARD**: **AR** Series Driver |
| ② | Power Supply Input | **K**: 24/48 VDC |
| ③ | Type | **D**: Built-in Controller Type<br>Blank: Pulse Input Type |

### Connection Cable Sets/Flexible Connection Cable Sets

**CC 050 V A 2 F B 2**

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

| | | |
|---|---|---|
| ① | | **CC**: Cable |
| ② | Length | **010**: 1 m (3.3 ft.) **020**: 2 m (6.6 ft.) **030**: 3 m (9.8 ft.)<br>**050**: 5 m (16.4 ft.) **070**: 7 m (23.0 ft.) **100**: 10 m (32.8 ft.)<br>**150**: 15 m (49.2 ft.) **200**: 20 m (65.6 ft.) **300**: 30 m (98.4 ft.) |
| ③ | Reference Number | |
| ④ | Applicable Product | **A**: **AR** Series |
| ⑤ | Reference Number | Blank: **ARM46**, **66**, **69**, **98**<br>**2**: **ARM24**, **26** |
| ⑥ | Cable Type | **F**: Connection Cable Sets<br>**R**: Flexible Connection Cable Sets |
| ⑦ | Electromagnetic Brake | Blank: Without Electromagnetic Brake<br>**B**: With Electromagnetic Brake |
| ⑧ | Cable Specification | **2**: DC Power Supply Input |

AC Input

DC Input

# Product Line

## ◇Standard Type

| Product Name (Single shaft) | List Price | Product Name (Double shaft) | List Price |
|---|---|---|---|
| **ARM24SAK** | $146.00 | **ARM24SBK** | $148.00 |
| **ARM26SAK** | $155.00 | **ARM26SBK** | $157.00 |
| **ARM46AK** | $137.00 | **ARM46BK** | $140.00 |
| **ARM66AK** | $192.00 | **ARM66BK** | $194.00 |
| **ARM69AK** | $214.00 | **ARM69BK** | $217.00 |
| **ARM98AK** | $257.00 | **ARM98BK** | $260.00 |

## ◇Standard Type with Electromagnetic Brake

| Product Name | List Price |
|---|---|
| - | - |
| **ARM46MK** | $330.00 |
| **ARM66MK** | $385.00 |
| **ARM69MK** | $408.00 |
| **ARM98MK** | $450.00 |

## ◇**TH** Geared Type

| Product Name | List Price |
|---|---|
| **ARM24SAK-T7.2** | $299.00 |
| **ARM24SAK-T10** | $311.00 |
| **ARM24SAK-T20** | $311.00 |
| **ARM24SAK-T30** | $311.00 |
| **ARM46AK-T3.6** | $243.00 |
| **ARM46AK-T7.2** | $243.00 |
| **ARM46AK-T10** | $256.00 |
| **ARM46AK-T20** | $256.00 |
| **ARM46AK-T30** | $256.00 |
| **ARM66AK-T3.6** | $311.00 |
| **ARM66AK-T7.2** | $311.00 |
| **ARM66AK-T10** | $323.00 |
| **ARM66AK-T20** | $323.00 |
| **ARM66AK-T30** | $323.00 |
| **ARM98AK-T3.6** | $402.00 |
| **ARM98AK-T7.2** | $402.00 |
| **ARM98AK-T10** | $415.00 |
| **ARM98AK-T20** | $415.00 |
| **ARM98AK-T30** | $415.00 |

## ◇**TH** Geared Type with Electromagnetic Brake

| Product Name | List Price |
|---|---|
| - | - |
| **ARM46MK-T3.6** | $437.00 |
| **ARM46MK-T7.2** | $437.00 |
| **ARM46MK-T10** | $449.00 |
| **ARM46MK-T20** | $449.00 |
| **ARM46MK-T30** | $449.00 |
| **ARM66MK-T3.6** | $504.00 |
| **ARM66MK-T7.2** | $504.00 |
| **ARM66MK-T10** | $517.00 |
| **ARM66MK-T20** | $517.00 |
| **ARM66MK-T30** | $517.00 |
| **ARM98MK-T3.6** | $596.00 |
| **ARM98MK-T7.2** | $596.00 |
| **ARM98MK-T10** | $608.00 |
| **ARM98MK-T20** | $608.00 |
| **ARM98MK-T30** | $608.00 |

## ◇**PS** Geared Type

| Product Name | List Price |
|---|---|
| **ARM24SAK-PS5** | $371.00 |
| **ARM24SAK-PS7** | $371.00 |
| **ARM24SAK-PS10** | $371.00 |
| **ARM46AK-PS5** | $344.00 |
| **ARM46AK-PS7** | $344.00 |
| **ARM46AK-PS10** | $344.00 |
| **ARM46AK-PS25** | $389.00 |
| **ARM46AK-PS36** | $389.00 |
| **ARM46AK-PS550** | $389.00 |
| **ARM66AK-PS5** | $444.00 |
| **ARM66AK-PS7** | $444.00 |
| **ARM66AK-PS10** | $444.00 |
| **ARM66AK-PS25** | $507.00 |
| **ARM66AK-PS36** | $507.00 |
| **ARM66AK-PS550** | $507.00 |
| **ARM98AK-PS5** | $572.00 |
| **ARM98AK-PS7** | $572.00 |
| **ARM98AK-PS10** | $572.00 |
| **ARM98AK-PS25** | $680.00 |
| **ARM98AK-PS36** | $680.00 |
| **ARM98AK-PS550** | $680.00 |

## ◇**PS** Geared Type with Electromagnetic Brake

| Product Name | List Price |
|---|---|
| - | - |
| **ARM46MK-PS5** | $537.00 |
| **ARM46MK-PS7** | $537.00 |
| **ARM46MK-PS10** | $537.00 |
| **ARM46MK-PS25** | $582.00 |
| **ARM46MK-PS36** | $582.00 |
| **ARM46MK-PS550** | $582.00 |
| **ARM66MK-PS5** | $637.00 |
| **ARM66MK-PS7** | $637.00 |
| **ARM66MK-PS10** | $637.00 |
| **ARM66MK-PS25** | $700.00 |
| **ARM66MK-PS36** | $700.00 |
| **ARM66MK-PS550** | $700.00 |
| **ARM98MK-PS5** | $765.00 |
| **ARM98MK-PS7** | $765.00 |
| **ARM98MK-PS10** | $765.00 |
| **ARM98MK-PS25** | $873.00 |
| **ARM98MK-PS36** | $873.00 |
| **ARM98MK-PS550** | $873.00 |

### ◇PN Geared Type

| Product Name | List Price |
|---|---|
| **ARM24SAK-N5** | $574.00 |
| **ARM24SAK-N7.2** | $574.00 |
| **ARM24SAK-N10** | $574.00 |
| **ARM46AK-N5** | $425.00 |
| **ARM46AK-N7.2** | $425.00 |
| **ARM46AK-N10** | $425.00 |
| **ARM66AK-N5** | $624.00 |
| **ARM66AK-N7.2** | $624.00 |
| **ARM66AK-N10** | $624.00 |
| **ARM66AK-N25** | $756.00 |
| **ARM66AK-N36** | $756.00 |
| **ARM66AK-N50** | $756.00 |
| **ARM98AK-N5** | $916.00 |
| **ARM98AK-N7.2** | $916.00 |
| **ARM98AK-N10** | $916.00 |
| **ARM98AK-N25** | $1,016.00 |
| **ARM98AK-N36** | $1,016.00 |
| **ARM98AK-N50** | $1,016.00 |

### ◇PN Geared Type with Electromagnetic Brake

| Product Name | List Price |
|---|---|
| - | - |
| **ARM46MK-N5** | $618.00 |
| **ARM46MK-N7.2** | $618.00 |
| **ARM46MK-N10** | $618.00 |
| **ARM66MK-N5** | $817.00 |
| **ARM66MK-N7.2** | $817.00 |
| **ARM66MK-N10** | $817.00 |
| **ARM66MK-N25** | $950.00 |
| **ARM66MK-N36** | $950.00 |
| **ARM66MK-N50** | $950.00 |
| **ARM98MK-N5** | $1,110.00 |
| **ARM98MK-N7.2** | $1,110.00 |
| **ARM98MK-N10** | $1,110.00 |
| **ARM98MK-N25** | $1,210.00 |
| **ARM98MK-N36** | $1,210.00 |
| **ARM98MK-N50** | $1,210.00 |

### ◇Harmonic Geared Type

| Product Name | List Price |
|---|---|
| **ARM24SAK-H50** | $608.00 |
| **ARM24SAK-H100** | $608.00 |
| **ARM46AK-H50** | $609.00 |
| **ARM46AK-H100** | $609.00 |
| **ARM66AK-H50** | $894.00 |
| **ARM66AK-H100** | $894.00 |
| **ARM98AK-H50** | $1,274.00 |
| **ARM98AK-H100** | $1,274.00 |

### ◇Harmonic Geared Type with Electromagnetic Brake

| Product Name | List Price |
|---|---|
| - | - |
| **ARM46MK-H50** | $803.00 |
| **ARM46MK-H100** | $803.00 |
| **ARM66MK-H50** | $1,087.00 |
| **ARM66MK-H100** | $1,087.00 |
| **ARM98MK-H50** | $1,467.00 |
| **ARM98MK-H100** | $1,467.00 |

## ●Driver

### ◇Built-in Controller Type

| Power Supply Input | Product Name | List Price |
|---|---|---|
| 24/48 VDC | **ARD-KD** | $398.00 |

### ◇Pulse Input Type

| Power Supply Input | Product Name | List Price |
|---|---|---|
| 24/48 VDC | **ARD-K** | $348.00 |

## ● Connection Cable Sets/Flexible Connection Cable Sets

Use a flexible connection cable set if the cable will be bent. Extension cables and flexible extension cables that can extend the connection cables are available.

### [For **ARM24** and **ARM26**]

◇For Motor

Cable for Motor

| Type | Length m (ft.) | Product Name | List Price |
|---|---|---|---|
| Connection Cable Sets | 1 (3.3) | **CC010VA2F2** | $61.00 |
| | 2 (6.6) | **CC020VA2F2** | $74.00 |
| | 3 (9.8) | **CC030VA2F2** | $88.00 |
| | 5 (16.4) | **CC050VA2F2** | $114.00 |
| | 7 (23.0) | **CC070VA2F2** | $140.00 |
| | 10 (32.8) | **CC100VA2F2** | $180.00 |
| | 15 (49.2) | **CC150VA2F2** | $246.00 |
| | 20 (65.6) | **CC200VA2F2** | $312.00 |
| | 30 (98.4) | **CC300VA2F2** | $444.00 |
| Flexible Connection Cable Sets | 1 (3.3) | **CC010VA2R2** | $100.00 |
| | 2 (6.6) | **CC020VA2R2** | $136.00 |
| | 3 (9.8) | **CC030VA2R2** | $172.00 |
| | 5 (16.4) | **CC050VA2R2** | $244.00 |
| | 7 (23.0) | **CC070VA2R2** | $316.00 |
| | 10 (32.8) | **CC100VA2R2** | $424.00 |
| | 15 (49.2) | **CC150VA2R2** | $604.00 |
| | 20 (65.6) | **CC200VA2R2** | $784.00 |
| | 30 (98.4) | **CC300VA2R2** | $1,144.00 |

### [For **ARM46**, **ARM66**, **ARM69**, **ARM98**]

◇For Motor

Cable for Motor

| Type | Length m (ft.) | Product Name | List Price |
|---|---|---|---|
| Connection Cable Sets | 1 (3.3) | **CC010VAF2** | $61.00 |
| | 2 (6.6) | **CC020VAF2** | $74.00 |
| | 3 (9.8) | **CC030VAF2** | $88.00 |
| | 5 (16.4) | **CC050VAF2** | $114.00 |
| | 7 (23.0) | **CC070VAF2** | $140.00 |
| | 10 (32.8) | **CC100VAF2** | $180.00 |
| | 15 (49.2) | **CC150VAF2** | $246.00 |
| | 20 (65.6) | **CC200VAF2** | $312.00 |
| | 30 (98.4) | **CC300VAF2** | $444.00 |
| Flexible Connection Cable Sets | 1 (3.3) | **CC010VAR2** | $100.00 |
| | 2 (6.6) | **CC020VAR2** | $136.00 |
| | 3 (9.8) | **CC030VAR2** | $172.00 |
| | 5 (16.4) | **CC050VAR2** | $244.00 |
| | 7 (23.0) | **CC070VAR2** | $316.00 |
| | 10 (32.8) | **CC100VAR2** | $424.00 |
| | 15 (49.2) | **CC150VAR2** | $604.00 |
| | 20 (65.6) | **CC200VAR2** | $784.00 |
| | 30 (98.4) | **CC300VAR2** | $1,144.00 |

◇For Motor/Electromagnetic Brake

Cable for Motor

Cable for Electromagnetic Brake

| Type | Length m (ft.) | Product Name | List Price |
|---|---|---|---|
| Connection Cable Sets | 1 (3.3) | **CC010VAFB2** | $80.00 |
| | 2 (6.6) | **CC020VAFB2** | $96.00 |
| | 3 (9.8) | **CC030VAFB2** | $112.00 |
| | 5 (16.4) | **CC050VAFB2** | $143.00 |
| | 7 (23.0) | **CC070VAFB2** | $174.00 |
| | 10 (32.8) | **CC100VAFB2** | $221.00 |
| | 15 (49.2) | **CC150VAFB2** | $299.00 |
| | 20 (65.6) | **CC200VAFB2** | $377.00 |
| | 30 (98.4) | **CC300VAFB2** | $533.00 |
| Flexible Connection Cable Sets | 1 (3.3) | **CC010VARB2** | $122.00 |
| | 2 (6.6) | **CC020VARB2** | $164.00 |
| | 3 (9.8) | **CC030VARB2** | $206.00 |
| | 5 (16.4) | **CC050VARB2** | $290.00 |
| | 7 (23.0) | **CC070VARB2** | $374.00 |
| | 10 (32.8) | **CC100VARB2** | $500.00 |
| | 15 (49.2) | **CC150VARB2** | $710.00 |
| | 20 (65.6) | **CC200VARB2** | $920.00 |
| | 30 (98.4) | **CC300VARB2** | $1,340.00 |

## Included

### Motor

| Type | Included | Parallel Key | Surge Suppressor | Operating Manual |
|---|---|---|---|---|
| Standard Type | | - | 1 piece (Only for products with an electromagnetic brake) | 1 Copy |
| **TH** Geared Type | Frame Size 28 mm (1.10 in.) | - | | |
| | Frame Size 42 mm (1.65 in.) | - | | |
| | Frame Size 60 mm (2.36 in.) | - | | |
| | Frame Size 90 mm (3.54 in.) | 1 piece | | |
| **PS** Geared Type **PN** Geared Type Harmonic Geared Type | Frame Size 28 mm (1.10 in.) | - | | |
| | Frame Size 30 mm (1.18 in.) | - | | |
| | Frame Size 42 mm (1.65 in.) | 1 piece | | |
| | Frame Size 60 mm (2.36 in.) | 1 piece | | |
| | Frame Size 90 mm (3.54 in.) | 1 piece | | |

### Driver

| Type | Included | Connector | Operating Manual |
|---|---|---|---|
| Built-in Controller Type | | · CN1 Connector (1 piece)<br>· CN5 Connector (1 piece)<br>· CN8 Connector (1 piece)<br>· CN9 Connector (1 piece) | 1 Copy |
| Pulse Input Type | | · CN1 Connector (1 piece)<br>· CN5 Connector (1 piece) | 1 Copy |

### Connection Cable Sets/Flexible Connection Cable Sets

| Type | Included | Operating Manual |
|---|---|---|
| Connection Cable Sets | | — |
| Flexible Connection Cable Sets | | 1 Copy |



For details (specifications, characteristics, dimensions and more) on these products, please either refer to our website or contact technical support or your nearest Oriental Motor sales office.
www.orientalmotor.com