Oriental motor

AZ Series

Equipped with Battery-Free Absolute Sensor

ADVANCED
PERFORMANCE

Absolute × Battery-Free
Brings advanced POSITIONING close to hand.

The new **AZ** Series line-up achieves absolute positioning without the need for a battery.
As a battery is not needed this contributes to a reduction in total cost.
So the **AZ** Series offers absolute positioning for an affordable price.

＊See page 12 for details on the lineup.

HPG Geared Type

PS Geared Type

□20 mm

□28 mm

□42 mm

AZ Series

Equipped with Battery-Free Absolute Sensor

■ Lineup

Standard Options	□20 mm/□28 mm/□85 mm
Geared Options with Electromagnetic Brake	□42 mm/□60 mm/□90 mm

Harmonic Geared Type

TS Geared Type

□85 mm

□60 mm

ADVANCED
PERFORMANCE

Achieve a battery-free absolute system
by equipping with a newly developed ABZO sensor.

Equipped with battery-free
mechanical absolute sensor.

[Details on page 5]

Speedy homing
with less cabling
as external sensors
no longer required.

[Details on page 6]

The battery-free
nature of the AZ Series
allows for easy global shipping,
even with long
delivery times.

[Details on page 7]

Peace of mind and energy savings with our highly reliable & efficient **AZ** motor series.

Setup is simple due to usable functions and settings.

Save energy with
a highly reliable
and efficient
αSTEP motor.

[Details on page 8]

Two drivers can
be selected via
a master controller.

[Details on page 9]

Construct
a simple system
without a separate
pulse generator.

[Details on page 10]

Setup time is reduced
due to helpful in-built
test functions.

[Details on page 10]

Monitor functions allow
for easy analysis of the motor
running condition, facilitating
timely maintenance.

[Details on page 11]

Equipped with a newly developed ABZO sensor, this is advanced technology at an affordable price.

Newly developed **ABZO** sensor

We have developed a compact, low cost, battery-free mechanical absolute sensor (patented).
This affordable motor series allows for productivity improvements and cost reductions.

Battery-Free

Equipped with multirotation absolute sensor

MODEL
AZM66AC
Oriental motor
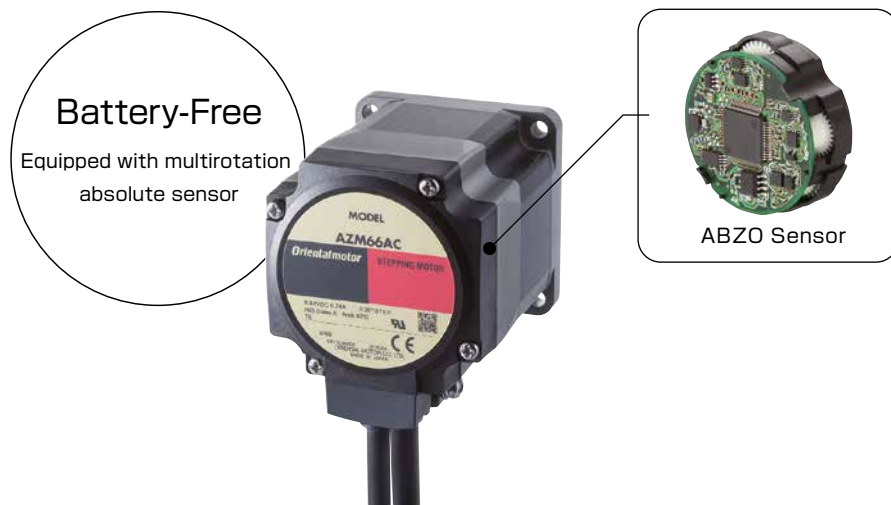
ABZO Sensor

● Mechanical Sensor

Analog clocks measure the current time based on the positions of the second hand, minute hand and hour hand. ABZO sensor is a mechanical sensor equipped with multiple gears equivalent to the hands on a clock. As it detects positioning information by detecting the angles of the respective gears, a battery is not required.
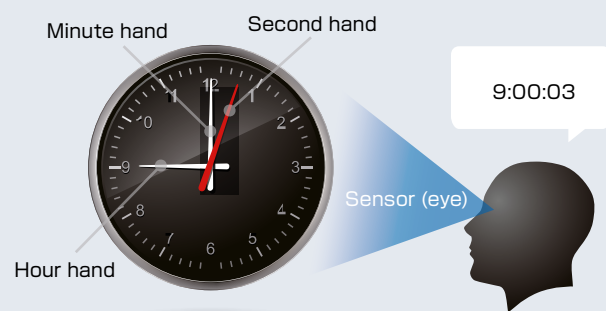
● Multirotation Absolute System

Absolute position detection is possible with ±900 rotations (1800 rotations)* of the motor shaft from the home position.
* The frame sizes 20 and 28 mm are ±450 rotations (900 rotations).

● Home Position Setting

By pressing the switch on the driver surface home position can be set simply, and the home position can be saved with the ABZO sensor. Furthermore, it is possible to set the home position using the data setting software (**MEXE02**) or the external input signal.

・Basic principles are like an analog clock

Minute hand   Second hand

9:00:03

Sensor (eye)

Hour hand

・Home Position Setting

Oriental motor
AZD-CD

Push switch

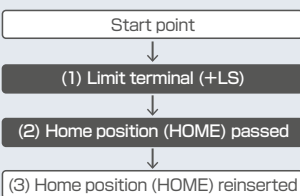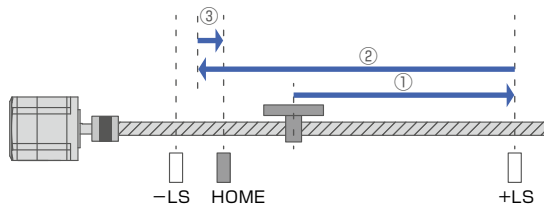# Achieves a Battery-Free Absolute System.

External Sensors Not Required

As it is an absolute system, external sensors such as the home sensor or limit sensor are not required.

● High Speed Return-to-Home + Improved Return-to-Home Accuracy

Because return-to-home is possible without using an external sensor, return-to-home can be performed at high speed without taking the sensor sensitivity into account, allowing for a shortened machine cycle. Furthermore, as return-to-home can be performed without concern for differences in the home sensor, it is possible to improve home position accuracy.
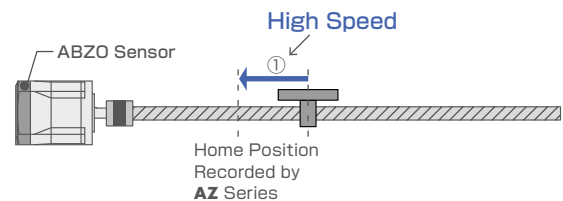
Pre-ABZO homing method example

The home position is detected at low speed by detecting the limit sensor (±LS) and home sensor (HOME).

③ ② ①

−LS   HOME   +LS

Start point
↓
(1) Limit terminal (+LS)
↓
(2) Home position (HOME) passed
↓
(3) Home position (HOME) reinserted

Return-to-home takes time …

AZ Series utilising ABZO sensor homing method

There is no need to detect the limit sensor, and it moves directly at high speed to the home position recorded by the ABZO sensor.

High Speed

ABZO Sensor   ①

Home Position Recorded by **AZ** Series

Start point
↓
↓
↓
↓
Home position

Through high speed return-to-home, machine cycle can be shortened!

● Cost reductions
Sensor costs and cable costs can be reduced, leading to lower system costs.

● Cable savings
This reduces cabling, increasing device design degree of freedom.

● Not affected by sensor
The AZ Series eliminates concerns such as sensor malfunctions, sensor faults or disconnection of the sensor lines. For example, sensor malfunctions due to metal flakes or oil mist floating about in the environment will be prevented.
●In systems where limit switches are not possible, software limits can be used to prevent the limit values being exceeded.
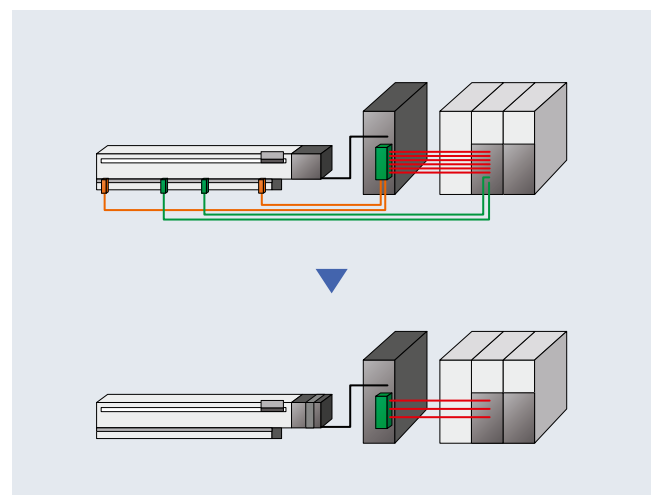
Battery-Free ABZO Sensor

As this is a mechanical sensor, a battery is not necessary.
The positioning information is managed mechanically
by the ABZO sensor.

Not necessary

● Maintaining Positioning Information

Even if the power shuts down during a positioning operation, the positioning information is retained. Furthermore, for built-in controller types, positioning operations can restart without performing a return-to-home operation when recovering from an emergency stop of the production line or a power cut.

●If the motor is temporarily replaced it is necessary to reset the home position as the positioning information is stored in the ABZO sensor.
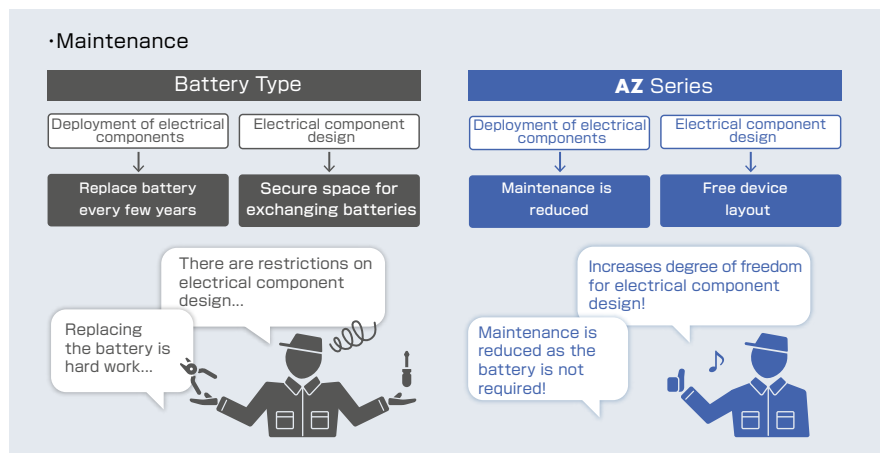
Built-in Controller Type

ABZO sensor — Emergency stop — **Can be restarted without returning to home**
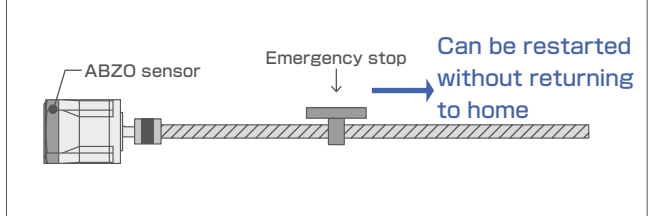
● Reduction in Maintenance

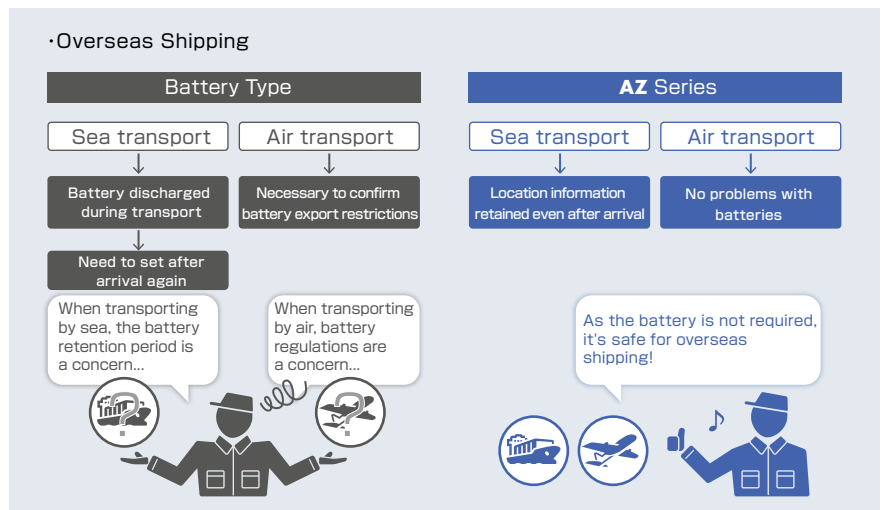There is no need to replace the battery, so the effort and cost of maintenance is reduced.

● Drivers take up less Space

As space is not required for the battery, this frees up space within the panel for other purposes.

·Maintenance

Battery Type		AZ Series	
Deployment of electrical components	Electrical component design	Deployment of electrical components	Electrical component design
↓	↓	↓	↓
Replace battery every few years	Secure space for exchanging batteries	Maintenance is reduced	Free device layout

There are restrictions on electrical component design...

Replacing the battery is hard work...

Increases degree of freedom for electrical component design!

Maintenance is reduced as the battery is not required!

● Safe for Overseas Shipping

As normal batteries are self discharging, care is required when transporting the device over long periods, such as in the case of overseas shipments. ABZO sensors do not require batteries, so there is no deadline for the storage of positioning information. Furthermore, there is no need to consider the respective regulations etc. when exporting overseas.

·Overseas Shipping

Battery Type		AZ Series	
Sea transport	Air transport	Sea transport	Air transport
↓	↓	↓	↓
Battery discharged during transport	Necessary to confirm battery export restrictions	Location information retained even after arrival	No problems with batteries
↓			
Need to set after arrival again			

When transporting by sea, the battery retention period is a concern...

When transporting by air, battery regulations are a concern...

As the battery is not required, it's safe for overseas shipping!

Save Energy with High Reliability and High Efficiency of αSTEP

High Reliability

We have adopted a proprietary control system.

We have achieved high reliability by linking the benefits of open loop control and closed loop control.

● **Keeps driving even in the case of sudden load changes or sudden acceleration**

Normally it drives with open loop control in sync with the pulse commands . At times of overload, control instantly switches to control using a closed loop, and perform positioning correction.

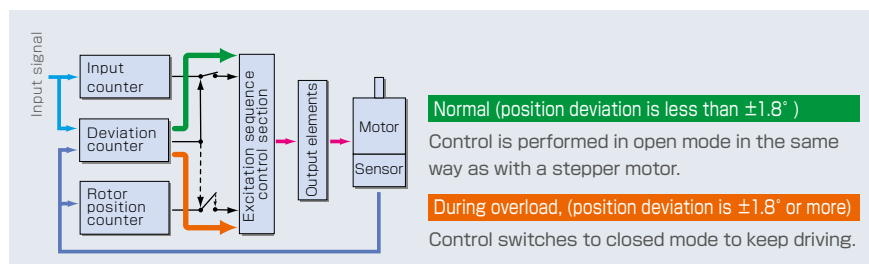● **Outputs an alarm signal in case an abnormality occurs**

When overload continuously occurs, an alarm signal is output and when positioning determination is complete, a signal is output. This supports high reliability.

● **Tuning not required**

As normally it drives with open loop control, when there is a change in load, such as in the belt mechanism, cam and chain drive, the positioning can be determined without gain adjustment.

● **Storing of stop position**

When determining positioning, it stops using the motor's own holding torque without hunting. Therefore it is suitable for use in a situation where vibration could cause a problem when stopping due to a low-rigidity mechanism.
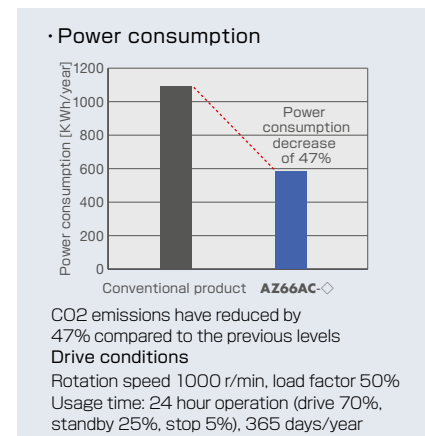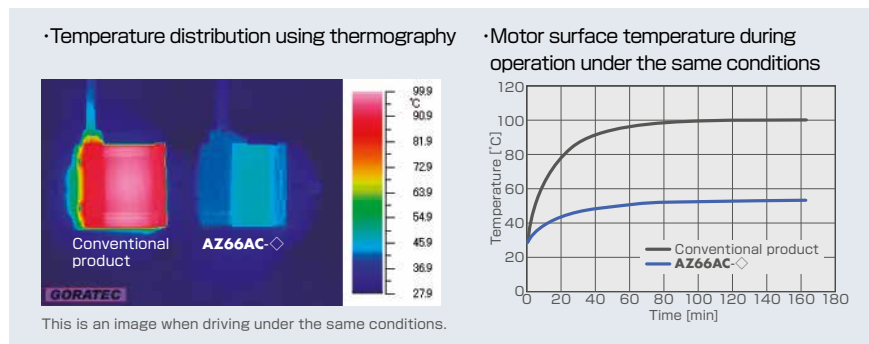
Normal (position deviation is less than ±1.8°)
Control is performed in open mode in the same way as with a stepper motor.

During overload, (position deviation is ±1.8° or more)
Control switches to closed mode to keep driving.

Energy Saving

Energy saving is also achieved by reducing motor heat generation through high efficiency.

● Reduced heat generation
We have achieved a significant decrease in heat generation through high efficiency.

·Temperature distribution using thermography

Conventional product   AZ66AC-◇

This is an image when driving under the same conditions.

·Motor surface temperature during operation under the same conditions

Conventional product
AZ66AC-◇

● The amount of power consumption has been reduced to 47% of its previous levels through energy saving

·Power consumption

Power consumption decrease of 47%

Conventional product   AZ66AC-◇

CO_2 emissions have reduced by 47% compared to the previous levels
Drive conditions
Rotation speed 1000 r/min, load factor 50%
Usage time: 24 hour operation (drive 70%, standby 25%, stop 5%), 365 days/year

Two drivers that can be chosen based on the master control system.

Built-in Controller Type

Pulse-Input Type

FLEX What is FLEX?

FLEX is the collective name for products supporting I/O control, Modbus (RTU) control and FA network control via network converters. This enables simple connections and simple control and this shortens the total lead time for system construction.

Built-in Controller Type FLEX

The built-in controller type driver allows for up-to 256 items of operating data, such as motor speed, position, acceleration / deceleration, interrupts, etc to be executed by a master controller via (1) I/O, (2) Modbus (RTU)/RS-485 or (3) FA network.

Basic Settings
(setting when shipped)
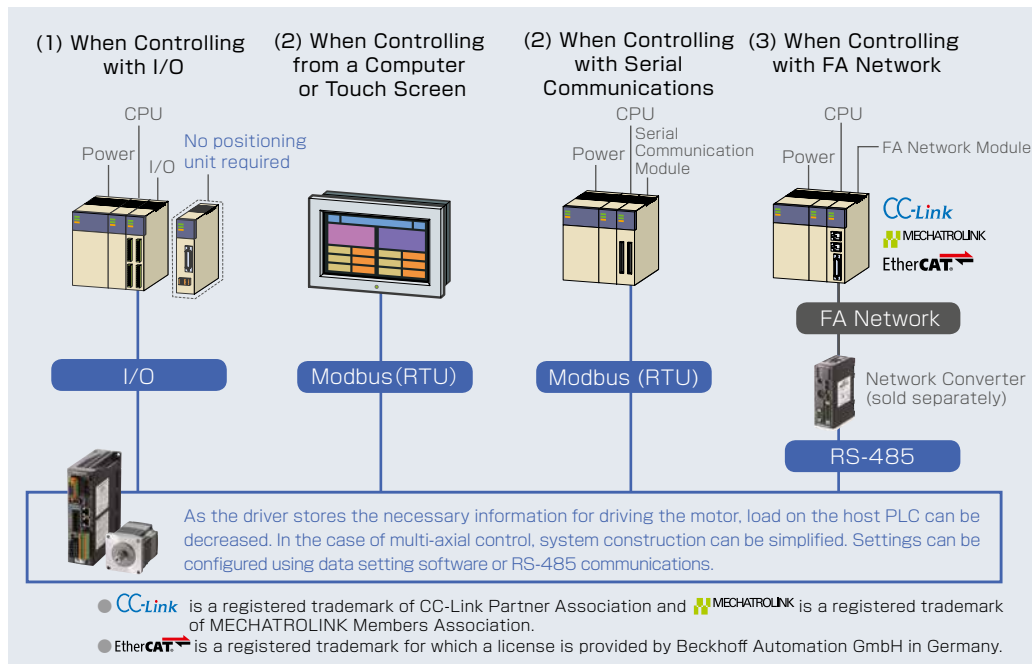
Driver

Motor

+

Operating Data Settings Parameter Changes

Data setting software (**MEXE02**)
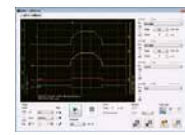
● Alternatively this can be set using RS-485 communications.

Through the use of network converters (sold separately), CC Link, MECHATROLINK and Ether-CAT communications are supported. Through the available communication protocols it is possible to set the operating data, parameters, and operating commands, allowing for shorter design and build times.

(1) When Controlling with I/O

CPU

Power I/O

No positioning unit required

I/O

(2) When Controlling from a Computer or Touch Screen

Modbus(RTU)

(2) When Controlling with Serial Communications

CPU

Power Serial Communication Module

Modbus (RTU)

(3) When Controlling with FA Network

CPU

Power FA Network Module

CC-Link
MECHATROLINK
EtherCAT.

FA Network

Network Converter (sold separately)

RS-485

As the driver stores the necessary information for driving the motor, load on the host PLC can be decreased. In the case of multi-axial control, system construction can be simplified. Settings can be configured using data setting software or RS-485 communications.

● CC-Link is a registered trademark of CC-Link Partner Association and MECHATROLINK is a registered trademark of MECHATROLINK Members Association.
● EtherCAT. is a registered trademark for which a license is provided by Beckhoff Automation GmbH in Germany.

Pulse-Input Type

The pulse-input type driver is driven by a pulse and direction input from a host PLC. Motion control is carried out via a pulse generator; an add on module to the PLC which must be prepared by the customer.
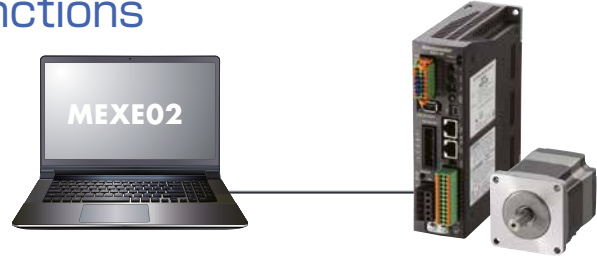
Basic Settings
(setting when shipped)

Driver

Motor

CPU

Power I/O Positioning Module

Pulse Signal Input
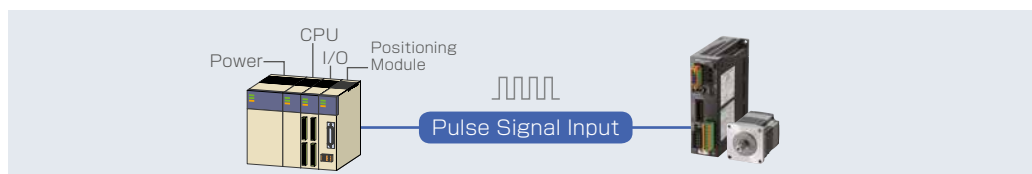
By using the data setting software (**MEXE02**), it is possible to confirm alarm history and monitor the various states.

● Data setting software (**MEXE02**) can be downloaded from the website.

Simple Settings and Usable Functions that could not be realized without **AZ**

Simple Settings/Easy Operations

By using the **MEXE02** software it is possible to adjust the motor configuration and edit multiple operating and parameter settings. Furthermore, the built-in controller is able to carry out sequential control from multiple inputs or predefined interrupts without requiring a master controller.

● Unit-type setting wizard

The units wizard is a function which allows the engineer to input the units they wish to work with. Thereby reducing the burden of converting units when inputing operational data.

● A simple system can be realised without a master controller.

The built-in controller type driver can set and execute independently up-to 256 items of operating data, such as motor speed and index length. Furthermore, with sequential control it is possible to form a simple system without a master controller. This is ideal for index and return operations or aligned transportation, such as lifespan / durability tests.

In case of questions please use our free hotline:
00800 22 55 66 22

Test Functions

Function for driving the motor independently and with which it is possible to connect with the master control system. By using during device startup, this can help to save time.

● Teaching Remote Operation `At startup`

It is possible to simply set home positions and drive the motor from the data setting software. Before connecting to the master control system, as it can perform teaching and test operations, this contributes to saving time for device startup.

Simple status monitor
Test operation
Teaching
JOG operation
FREE operation

● I/O Test `At startup` `When driving`

You can perform input signal monitoring and output signal forced output. This is a convenient function for confirming hard wiring with the master control system and the network I/O operation.
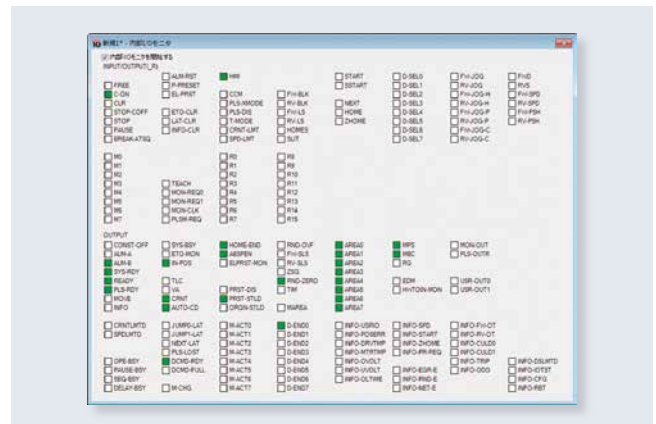
Monitor Function

Excellent monitor functions are included in order to confirm the motor driving state.
Using differently based on the various scenarios helps with device startup, shortening of adjustment time and efficient maintenance.

● Waveform Monitoring At startup

It is possible to monitor the motor driving state and output signal state in the same way as with an oscilloscope. Use this when starting up or adjusting the device.
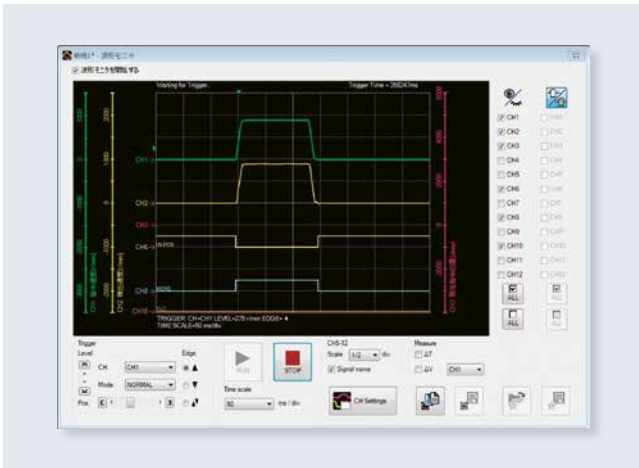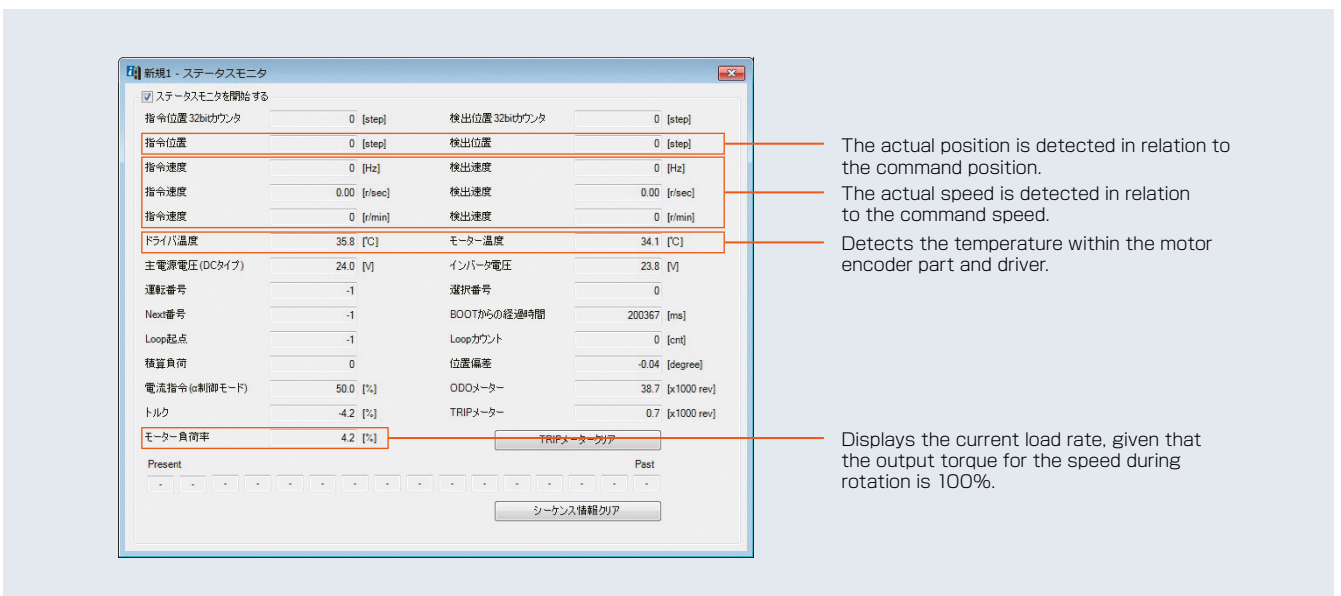

● Alarm Monitoring When driving During maintenance

When an abnormality occurred, it is possible to confirm the content of the abnormality, driving state when it occurred, and countermeasure methods. As the countermeasure method can be confirmed, the abnormality can be handled smoothly.

● Status Monitoring When driving During maintenance

When driving, it is possible to monitor speed, motor/driver temperature and load rate, as well as total revolutions from start of use. For the various items, as it is possible to set any signal to output, this is effective for efficient maintenance.

The actual position is detected in relation to the command position.

The actual speed is detected in relation to the command speed.

Detects the temperature within the motor encoder part and driver.

Displays the current load rate, given that the output torque for the speed during rotation is 100%.

Lineup

Motor and Driver Types

Motor Type	Electro-magnetic Brake	Power Input — Single-Phase 100-120 VAC / Single-Phase/Three-Phase 200-240 VAC / 24/48 VDC	Frame Size					Driver Type
			20 mm	28 mm	42 mm*2	60 mm	85 mm 90 mm*3	
Standard Type	No	AC	–	–	●	●	●	Built-in Controller Type
		DC	●*1	●*1	●	●	–	
	Yes	AC	–	–	●	●	●	
		DC	–	–	●	●	–	
TS Geared Type	No	AC	–	–	●	●	●	
		DC	–	–	●	●	–	
	Yes	AC	–	–	●	●	●	
		DC	–	–	●	●	–	AC Power Input DC Power Input
PS Geared Type	No	AC	–	–	●	●	●	
		DC	–	–	●	●	–	Pulse-Input Type
	Yes	AC	–	–	●	●	●	
		DC	–	–	●	●	–	
HPG Geared Type	No	AC	–	–	●	●	●	
		DC	–	–	●	●	–	
	Yes	AC	–	–	●	●	●	
		DC	–	–	●	●	–	
Harmonic Geared Type	No	AC	–	–	●	●	●	
		DC	–	–	●	●	–	AC Power Input DC Power Input
	Yes	AC	–	–	●	●	●	
		DC	–	–	●	●	–	

*1   24 VDC only
*2   **HPG** geared type is 40 mm
*3   in case of geared type

Actuator Lineup

We will introduce a lineup of actuators with the built-in **AZ** series.

Series Name	Features	Main Specification
αSTEP **AZ** Series Equipped Motorized Slider **EAS** Series AC power DC power	·Possible to drive at high speeds from light loads to heavy loads. ·Can drive stably even at low speeds (1.25 mm/s). ·Compact with high rigidity.	·Stroke: 50–850 mm ·High speed: 800 mm/s ·Maximum transportable mass: 60 kg (horizontal), 30 kg (vertical)
αSTEP **AZ** Series Equipped Motorized Slider **EZS** Series AC power DC power	·Compact with high rigidity. ·Simple dust-proof structure. ·Clean room support (ISO standard clean level class 3)	·Stroke: 50–850 mm ·High speed: 800 mm/s ·Maximum transportable mass: 60 kg (horizontal), 30 kg (vertical)
αSTEP **AZ** Series Equipped Motorized Slider **EAC** Series AC power DC power	·Possible to drive at high speeds from light loads to heavy loads. ·Can drive stably even at low speeds (1.25 mm/s). ·Compact with high rigidity. ·High thrust.	·Stroke: 50–300 mm ·High speed: 600 mm/s ·Maximum transportable mass: 60 kg (horizontal), 30 kg (vertical)
Hollow Rotary Actuator **DGII** Series Frame Size 85 mm, 130 mm, 200 mm AC power	·As this is a hollow output table, wiring, such as cables and air tubes etc. is simple. ·Possible to directly attach tables and arms.	·Maximum permissible torque: 50 N·m ·Maximum permissible moment: 100 N·m ·Maximum permissible axial load: 4000 Nm

Types and Features of Standard Types and Geared Types

Type		Features	Permissible Torque, Instantaneous Maximum Torque [N·m]	Backlash [arcmin]	Basic Resolution [°/pulse]	Output Shaft Rotation Speed [r/min]
	Standard type	·This is the basic **AZ** series model.	Excitation maximum static torque 4	——	0.36	6000
Low Backlash	**TS** Geared Type (Spur Gear Mechanism)	·Good lineup of low reduction ratio types, high speed operation ·Gear ratios: 3.6, 7.2, 10, 20, 30	Permissible torque / Instantaneous maximum torque 25 45	10	0.012	833
Low Backlash	**PS** Geared Type (Planetary Gear Mechanism)	·Permissible torque/ instantaneous maximum torque is large ·Lineup of gear ratios convenient for various step angles ·Center shaft ·Gear ratios: 5, 7.2, 10, 25, 36, 50	Permissible torque \ Instantaneous maximum torque 37 60	7	0.0072	600
Non-backlash	**HPG** Geared Type (Harmonic Planetary®)	·High positioning accuracy ·Permissible torque/ instantaneous maximum torque is large ·Center shaft ·Gear ratios: 5, 9, 15	Permissible torque \ Instantaneous maximum torque 24 33	3	0.024	900
Non-backlash	Harmonic Geared Type (Harmonic Drive®)	·High positioning accuracy ·Permissible torque/ instantaneous maximum torque is large ·High gear ratio, high resolution ·Center shaft ·Gear ratios: 50, 100	Permissible torque \ Instantaneous maximum torque 52 107	0	0.0036	70

Notes
- ● 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.
- ● Harmonic planetary, harmonic drive and ⬛ are registered trademarks and trademarks of Harmonic Drive Systems Inc.

As a variation on stepper motors, we have prepared a geared motor in which the gears are combined.
You can select the optimal type from among each geared motor, considering torque, accuracy (backlash) and price.

Function (torque/backlash) ↑

Low price — **TS** Geared Type

High Torque — **PS** Geared Type

High Accuracy / High Torque — **HPG** Geared Type

High Accuracy / High Torque — Harmonic Geared Type

List Price →