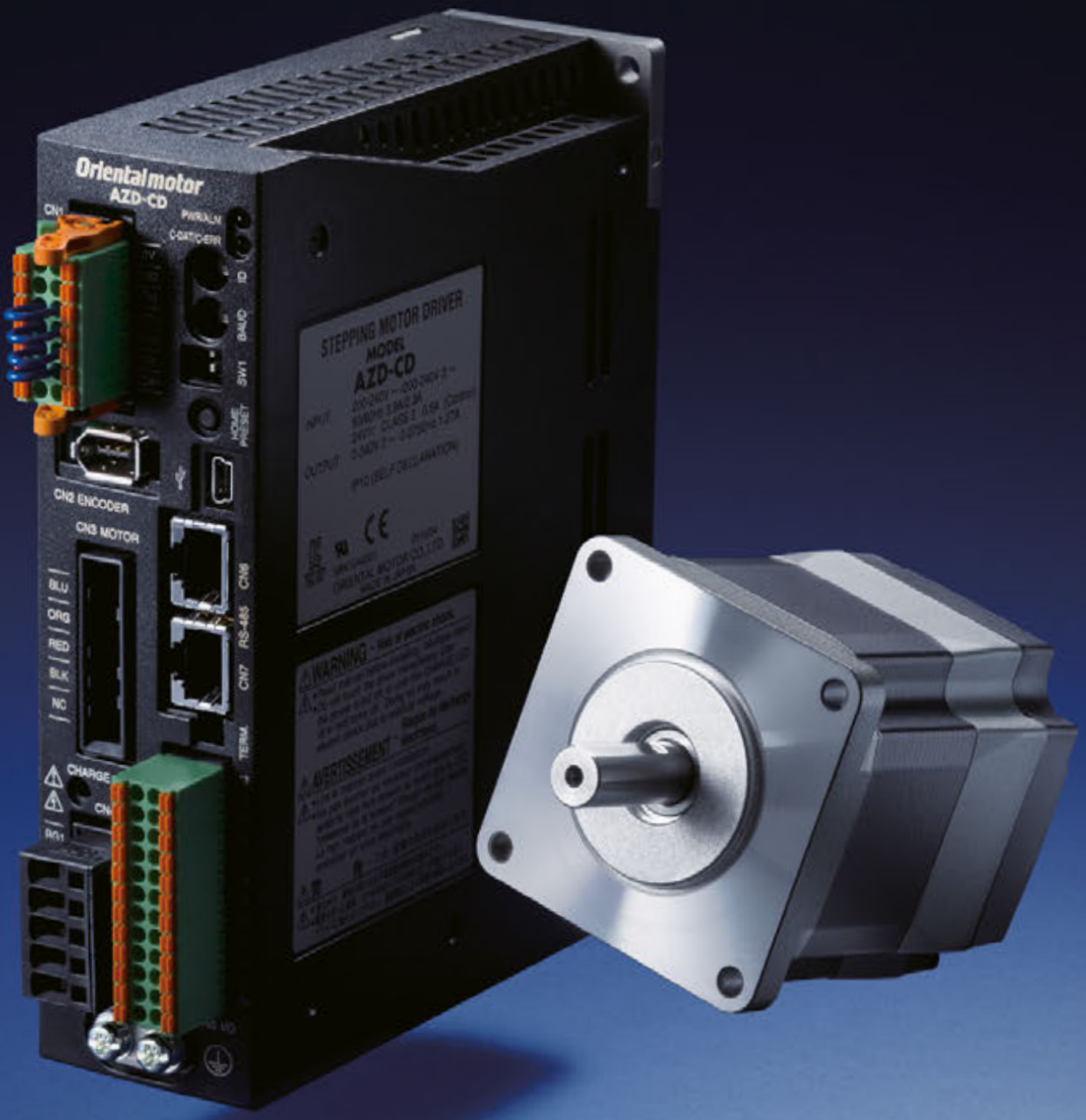
Oriental motor

Stepper Motor and Driver Package αSTEP

AZ Series

Equipped with Battery-Free Absolute Sensor

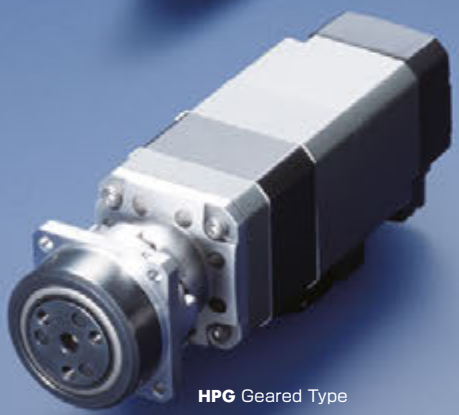


ADVANCED PERFORMANCE

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

Stepper Motor and Driver Package αSTEP

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

ADVANCED PERFORMANCE

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.

● 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

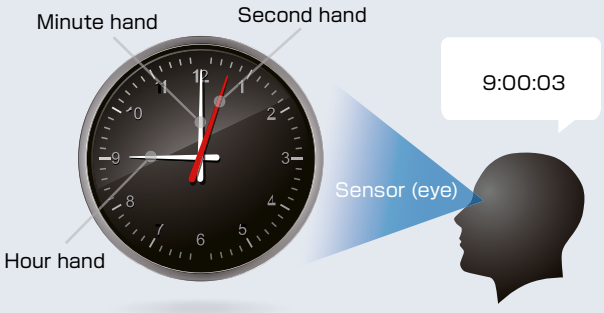
Absolute position detection is possible with ±900 rotations (1800 rotations)* of the motor shaft from the home position.

* The frame sizes 20 and 28 mm are ±450 rotations (900 rotations).

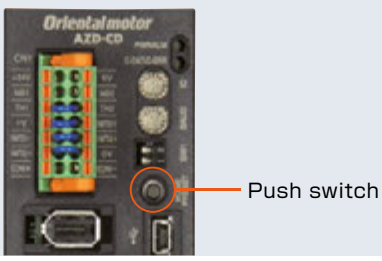
● Home Position Setting

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



·Home Position Setting



External Sensors Not Required

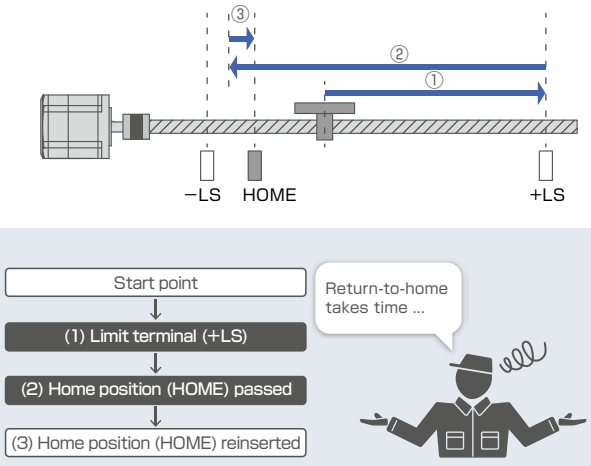
As it is an absolute system, external sensors such as the home sensor or limit sensor are not required.

● 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.

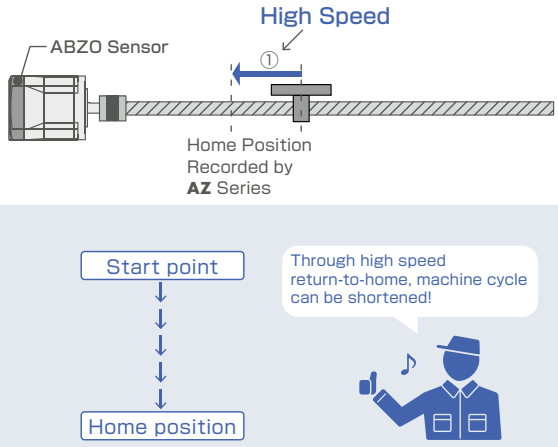
Pre-ABZO homing method example

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



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.



● Cost reductions

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

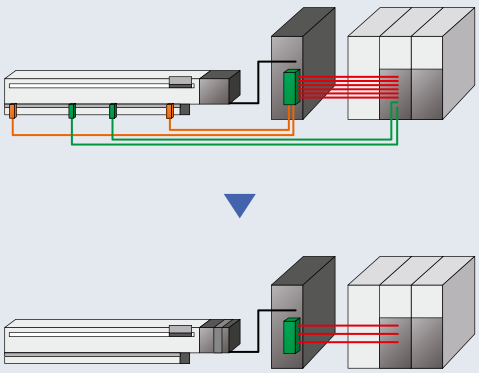
● Cable savings

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.



Achieves a Battery-Free Absolute System.

Battery-Free ABZO Sensor

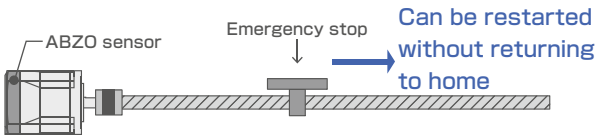
As this is a mechanical sensor, a battery is not necessary.
The positioning information is managed mechanically by the ABZO sensor.

● 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

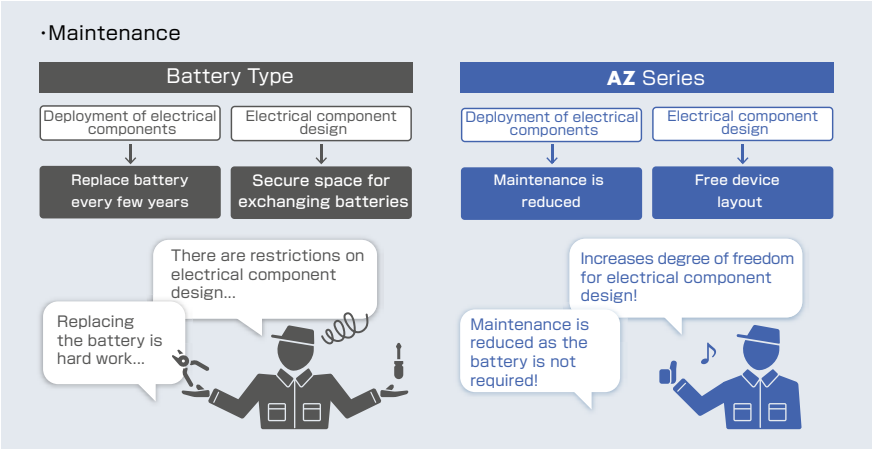


● Reduction in Maintenance

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

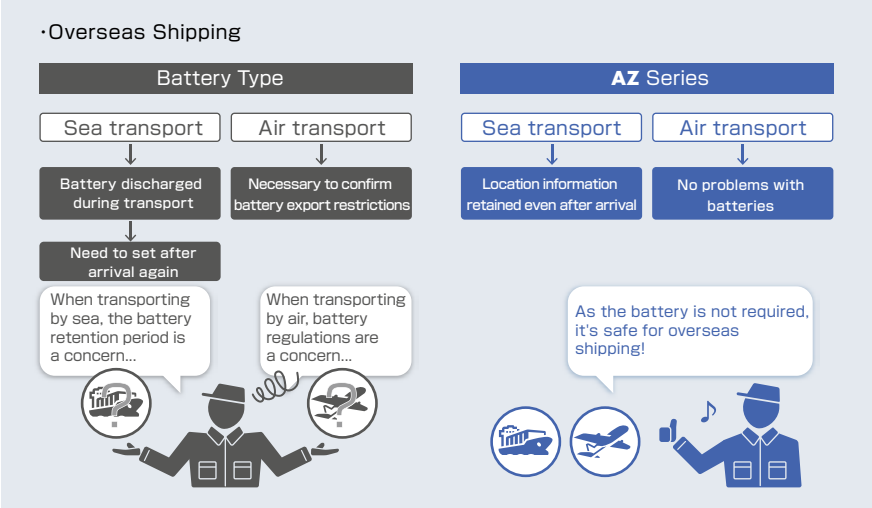
● Drivers take up less Space

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



● 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.



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

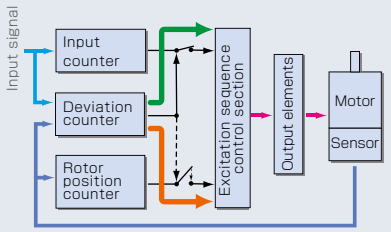
When overload continuously occurs, an alarm signal is output and when positioning determination is complete, a signal is output. This supports high reliability.

● 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

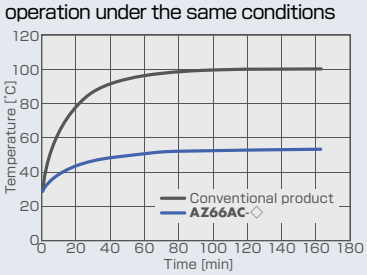
We have achieved a significant decrease in heat generation through high efficiency.

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

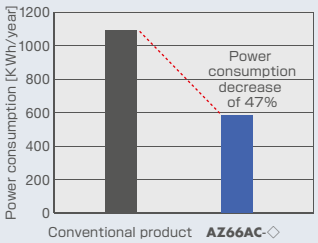
・Temperature distribution using thermography

This is an image when driving under the same conditions.

・Motor surface temperature during operation under the same conditions



・Power consumption



CO2 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


RS-485 Pulse-Input Type


MultiAxis Type

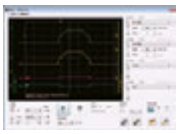
Built-in Controller Type FLEX AC DC

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)

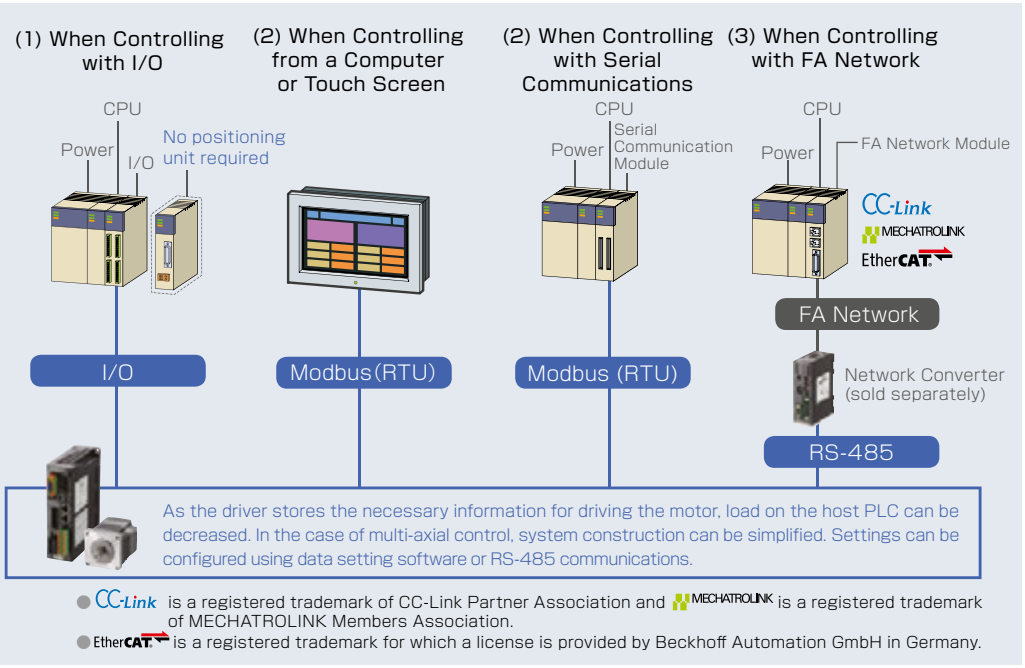
Operating Data Settings Parameter Changes

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 EtherCAT 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.



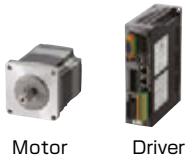
● CC-Link is a registered trademark of CC-Link Partner Association and MECHATROLINK is a registered trademark of MECHATROLINK Members Association.

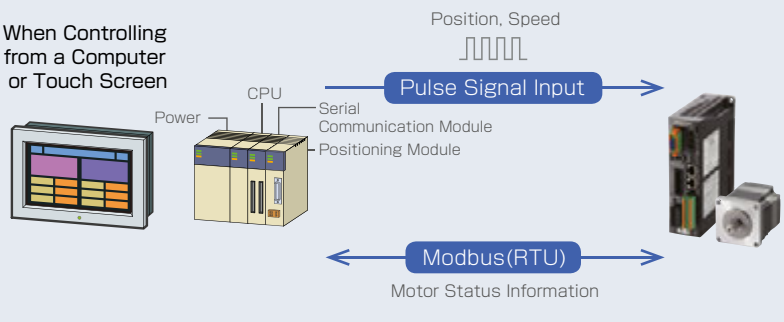
● EtherCAT is a registered trademark for which a license is provided by Beckhoff Automation GmbH in Germany.

NEW Pulse-Input Type with RS-485 Communication AC DC

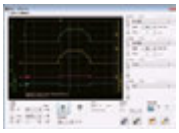
This type executes operations by inputting pulses into the driver. It controls the motor using a pulse generator. By using RS-485 communication motor status information (position, speed, torque, alarm, temperature, etc.) can be monitored.

Basic Settings (setting when shipped)





Operating Data Settings Parameter Settings Data setting software MEXE02

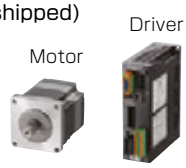


By using the MEXE02 data setting software, the alarm history can be displayed and a variety of monitoring can be customized according to the customer's needs.

Pulse-Input Type AC DC

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)

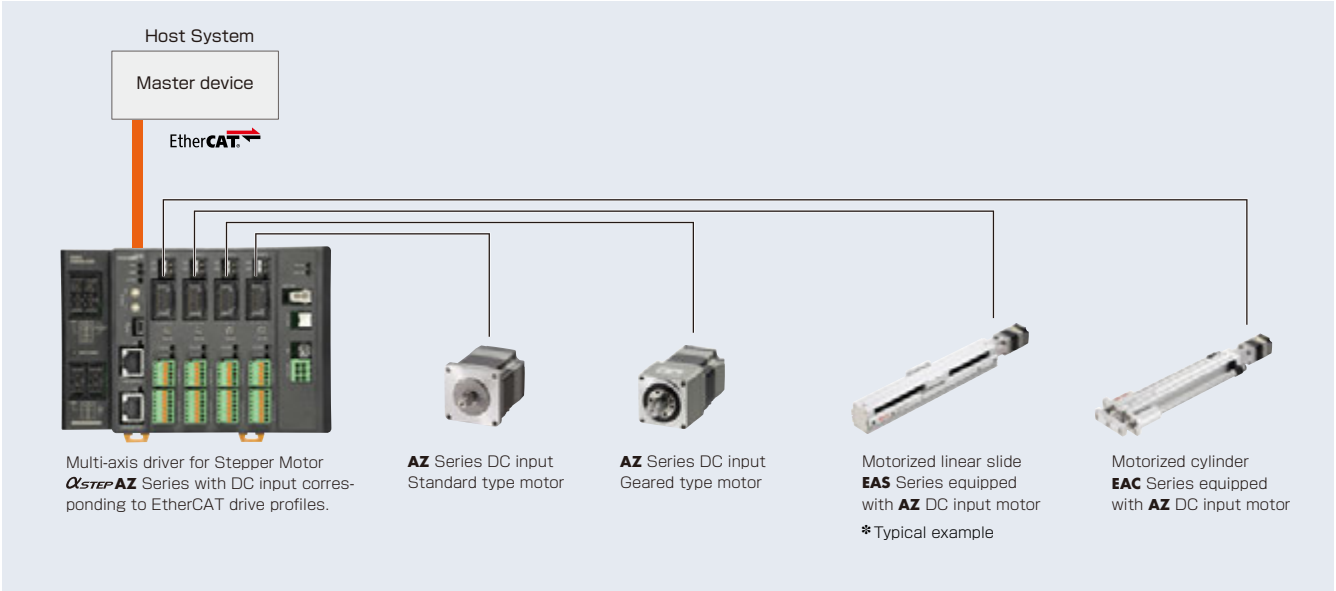


By using the data setting software (**MEXE02**), it is possible to confirm alarm history and monitor the various states.

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

NEW Network Compliant Multi-Axis Driver DC

This multi-axis driver is corresponding to EtherCAT drive profiles.
It can be connected to **AZ** Series DC input motors and to linear actuators equipped with those motors.
Drivers for 2 axes, 3 axes and 4 axes are available.



Multi-axis driver for Stepper Motor
αSTEP **AZ** Series with DC input corresponding to EtherCAT drive profiles.

AZ Series DC input
Standard type motor

AZ Series DC input
Geared type motor

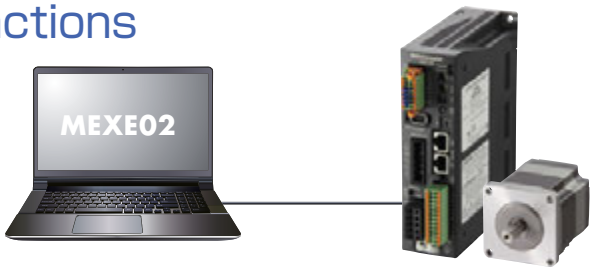
Motorized linear slide
EAS Series equipped
with **AZ** DC input motor

Motorized cylinder
EAC Series equipped
with **AZ** DC input motor

*Typical example

● EtherCAT is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.
● Data setting software (**MEXE02**) can be downloaded from the website.

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



Data setting software **MEXE02**

Data setting software can be downloaded from the website.

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.

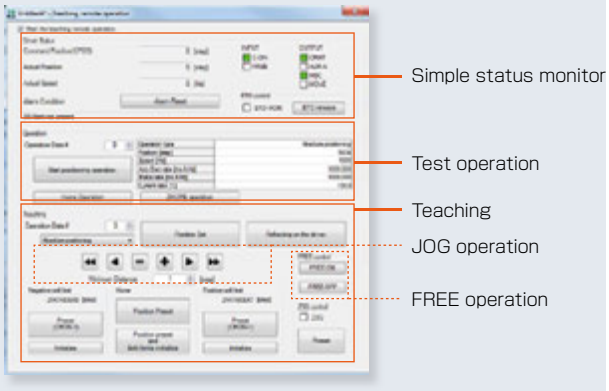
In case of questions please use our free hotline:
00800 22 55 66 22

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.

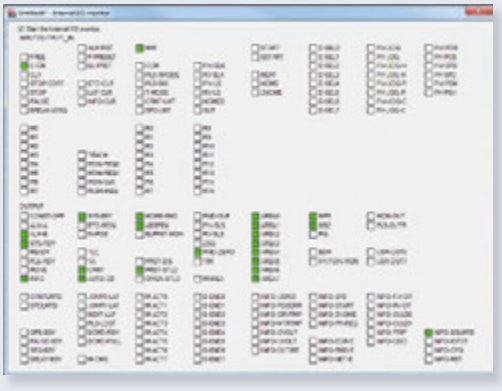
● Teaching Remote Operation At startup

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.



● 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

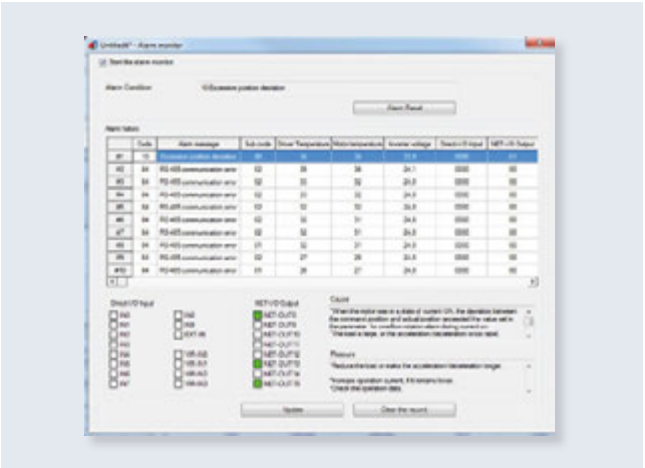
Excellent monitor functions are included in order to confirm the motor driving state.
Using differently based on the various scenarios helps with device startup, shortening of adjustment time and efficient maintenance.

● 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.

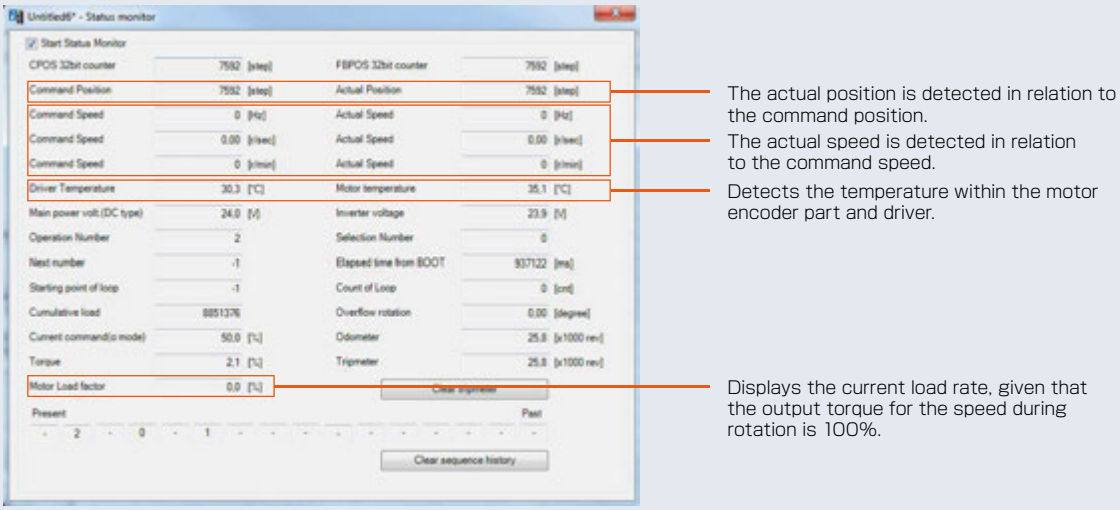
● Alarm Monitoring When driving During maintenance

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

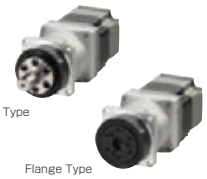
When driving, it is possible to monitor speed, motor/driver temperature and load rate, as well as total revolutions from start of use. For the various items, as it is possible to set any signal to output, this is effective for efficient maintenance.



Lineup

Motor

AC Single-Phase 200-240 VAC
DC 24/48 VDC

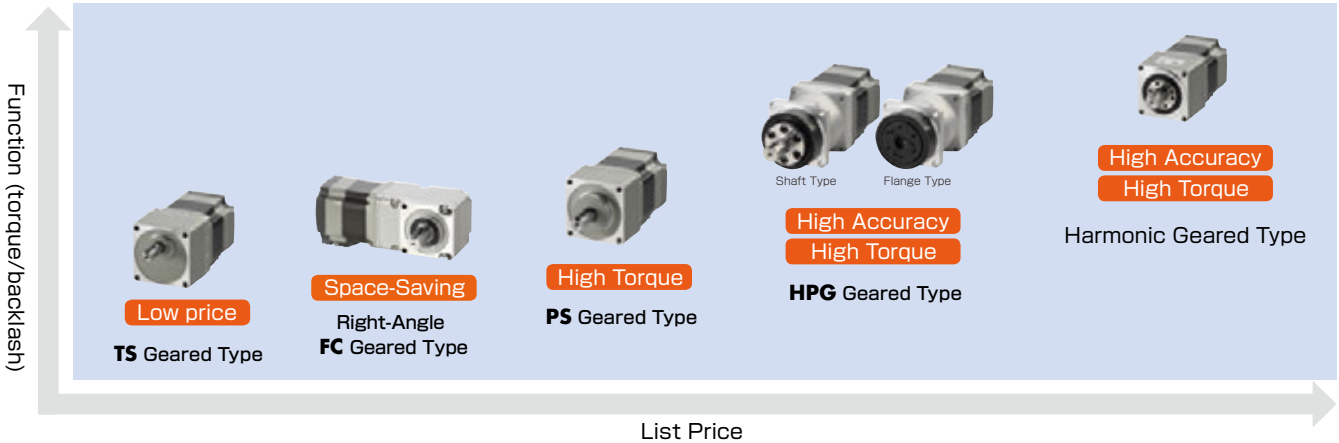
	Type	Electro-magnetic Brake	Frame Size				
			20mm	28mm*6	42mm*2	60mm	85mm 90mm*4
	Standard Type  Motor shaft shape One side milled/straight/with key	No	DC *1	DC *1	AC DC	AC DC	AC
		Yes	—	—	AC *3 DC *3	AC DC	AC *5
Low Backlash	**TS Geared Type** (Spur Gear Mechanism)  Cable direction can be selected Downward, upward, right, left Low gear ratios, high-speed operations Gear Ratio 7.2、10、20、30	No	—	—	AC DC	AC DC	AC
		Yes	—	—	AC DC	AC DC	AC
	Right Angle Gearhead **FC Geared Type** (Face Gear Mechanism)  Right-angled gearhead for positioning Gear Ratio 7.2、10、20、30	No	—	—	AC DC	AC DC	—
		Yes	—	—	AC DC	AC DC	—
	PS Geared Type (Planetary Gear Mechanism)  A wide variety of gear ratios for selecting the desired step angle Gear Ratio 5、7.2、10、25、36、50	No	—	NEW DC *1	AC DC	AC DC	AC
		Yes	—	—	AC DC	AC DC	AC
Non-backlash	**HPG Geared Type** (Harmonic Drive®)  Shaft Type Flange Type High positioning accuracy Gear Ratio 5、9、15	No	—	—	AC DC	AC DC	AC
		Yes	—	—	AC DC	AC DC	AC
	Harmonic Geared Type (Harmonic Drive®)  High positioning accuracy Gear Ratio 50、100	No	—	NEW DC *1	AC DC	AC DC	AC
		Yes	—	—	AC DC	AC DC	AC

*1 24 VDC only *2 **HPG** geared type is 40 mm *3 only for **AZM46** *4 in case of geared type *5 only for **AZM98** *6 Harmonic gear type is 30 mm

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.



Permissible Torque, Instantaneous Maximum Torque [N·m]	Backlash [arcmin]	Basic Resolution [°/pulse]	Output Shaft Rotation Speed [r/min]
Excitation maximum static torque 4	—	0.36	6000
Permissible torque / Instantaneous maximum torque 25 45	10	0.012	833
Permissible torque 10.5	10	0.012	416
Permissible torque / Instantaneous maximum torque 37 60	7	0.0072	600
Permissible torque / Instantaneous maximum torque 24 33	3	0.024	900
Permissible torque / Instantaneous maximum torque 52 107	0	0.0036	70

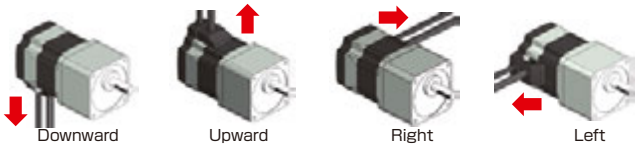
Driver

Type
Built-in Controller Type FLEX  AC DC
Pulse-Input Type with RS-485 Communication NEW  AC DC
Pulse-Input Type  AC DC
Network Compliant Multi-Axis Driver NEW  DC EtherCAT.

● FLEX is the collective name for products that support I/O control, Modbus (RTU) control and FA network control via network converters.
● EtherCAT. is a registered trademark for which a license is provided by Beckhoff Automation GmbH in Germany.

Shaft Shape and Cable Direction can be Selected to the Needs of Application.


One side milled　Straight　With key


Downward　Upward　Right　Left

The cable direction can be selected out of four directions from the output shaft.

● Standard Type

Frame Size \ Shaft Shape	One Side Milled	NEW Straight	NEW With key
20mm	●	—	—
28mm	●	—	—
42mm	●	●	● *
60mm	●	●	●
85mm	●	●	●

*AZM48 only

● TS Geared Type

Frame Size	Cable Direction			
	Downward	Upward NEW	Right NEW	Left NEW
42mm	●	●	●	●
60mm	●	●	●	●
90mm	●	●	●	●