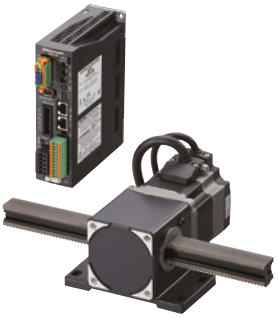
The Rack and Pinion System **L** Series Simplifies Compact, High-Power Linear Motion.

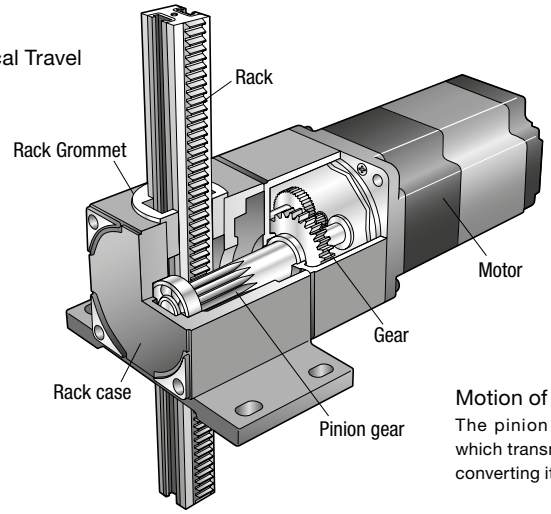


The **L** Series is a linear actuator in which a rack and pinion mechanism and a motor have been combined.
The motor is equipped with the **αSTEP AZ** Series that utilizes a battery-free absolute sensor, which allows for high positioning accuracy and high-load transportation up to 100 kg.

Easy to Use Linear Motion Mechanism that is “Compact” and “High Strength”

The Rack and Pinion System can easily convert the motor’s rotation to linear motion.
The linear motion mechanism has a compact design but it can transport large loads due to its high-strength fabrication.

Structure of Rack Vertical Travel



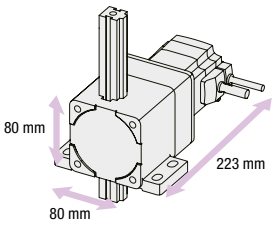
Motion of Rack and Pinion Systems
The pinion shaft motor engages the gear (decelerator), which transmits the movement of the pinion gear to the rack, converting it to linear motion.

Vertical Operation Can Handle a Max. Transportable Load of 100 kg and a Max. Stroke of 1000 mm

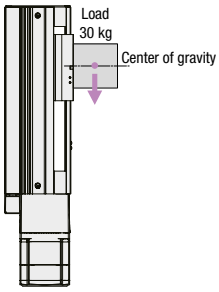
A variety of transportable mass and stroke are available to match your equipment.

Frame Size [mm]	Transportable Mass		Stroke [mm] 100 200 300 400 500 600 700 800 900 1000
60	Maximum	30 kg	
80	Maximum	100 kg	

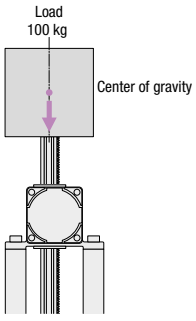
Handles high load and long strokes



Its compact size can transport up to 100 kg (with electromagnetic brake)



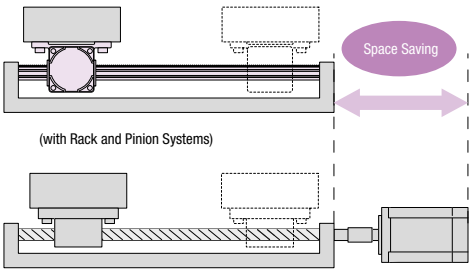
(with an electric linear slide with ball screw mechanism)



(with Rack and Pinion Systems)
If it is installed without having to consider external guides for moment loads, the transportable mass can be transported as is.

Space Saving

The body is able to move automatically by fixing the screw holes on both ends of the rack. It is effective in large equipment in which motor space is limited.



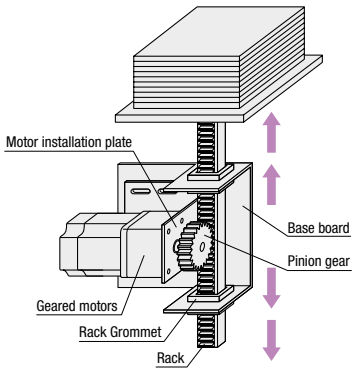
(with Rack and Pinion Systems)

(with ball screw mechanism)

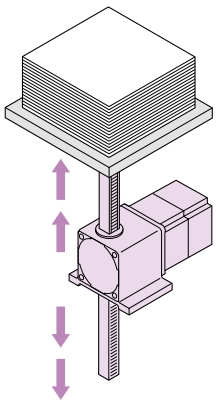
Shorter Time Between Design to Start-up

The Rack and Pinion System can reduce the number of parts used, and it can also significantly reduce the time spent on design and assembly.

If Parts are Purchased Separately

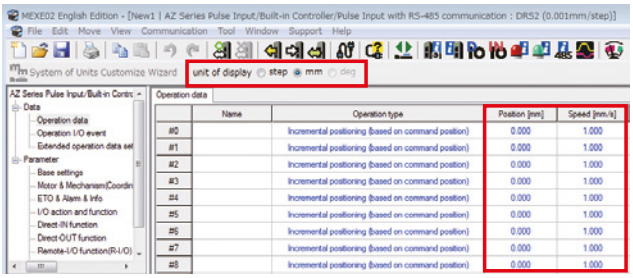


With Rack and Pinion Systems



Setting in Millimeter Increments

The drive motor is equipped with the **αSTEP AZ** Series hybrid control system. By combining with the **MEXE02*** support software, the linear motion can be easily set in millimeter increments, which allows for various linear motion applications.



[Minimum Travel Amount]
High-speed type 0.01 mm
High transportable mass type 0.001 mm

[Permissible Speed Range]
0～500 mm/s (High-speed type)
0～90 mm/s (High transportable mass type, frame size 60 mm)
0～40 mm/s (High transportable mass type, frame size 80 mm)

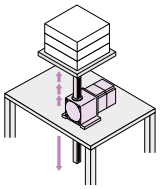
*The **MEXE02** support software can be downloaded from the Oriental Motor website.

What is Hybrid Control System αSTEP?

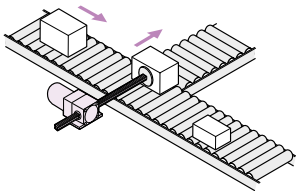
αSTEP is a stepper motor-based motor that can perform independent control in which the advantages of "closed loop control" and "open loop control" are combined. It can constantly monitor the motor's position, and it automatically switches between the two control system in response to the situation. It is usually driven in synchronization with the command using open loop control, which enhances its high-response capability. In an overload situation, it corrects the motor's position using closed loop control to continue operation. It is a motor that is easy to use and is also reliable.

Applications

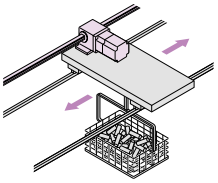
The Rack and Pinion Systems have many applications and they are easy to use.



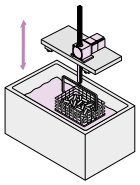
They make vertical operation easy. Types with an electro-magnetic brake are also available for vertical loads.



The high thrust force also makes push-and-pull operations easy.

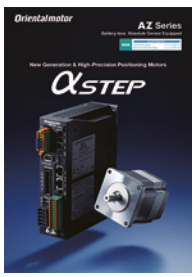


A wide variety of strokes and speeds are available.



Using the screw holes on both ends of the rack can simplify bolting loads and securing the rack.

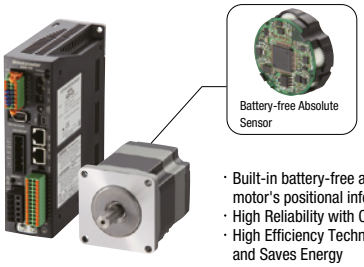
Please see the separate catalog for the **αSTEP AZ** Series product line-up.
To select a product, refer to the separate catalog, or see our website.



Easy Home Setting and Return-to-Home with an Absolute System Equipped with the αSTEP AZ Series Hybrid Control System

A compact mechanical multi-turn absolute sensor (patented) has been developed. This can help improve productivity and reduce costs.

αSTEP AZ Series
Equipped with Battery-free Absolute Sensor



- Built-in battery-free absolute sensor constantly monitors the motor's positional information without an external sensor.
- High Reliability with Closed Loop Control
- High Efficiency Technology Reduces Motor Heat Generation and Saves Energy

No Home Sensor Required

Because it is an absolute system, no home sensor is required.

High-Speed Return-to-Home Operation

Because return-to-home is possible without using a home sensor, return-to-home can be performed at high speed without taking the specifications for sensor sensitivity into account, allowing for a shortened machine cycle.

Reduced Cost

Sensor and wiring costs can be reduced, allowing for lower system costs.

Simple Wiring

Wiring is simplified, and the degree of freedom for equipment design is increased.

Not Affected by Sensor Malfunctions

No need to worry about sensor malfunctions, sensor damage or sensor disconnection.

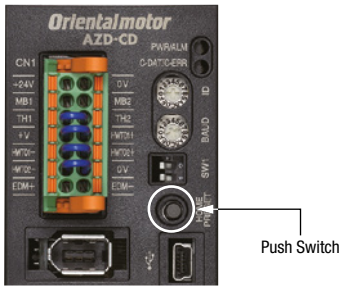
Improved Return-to-Home Accuracy

Home position accuracy is increased because the return-to-home action is performed regardless of any variations in home sensor sensitivity.

*If no limit sensor is installed, movements that exceed the limit values can be avoided through the use of the limits in the driver software.

Easy Home Position Setting

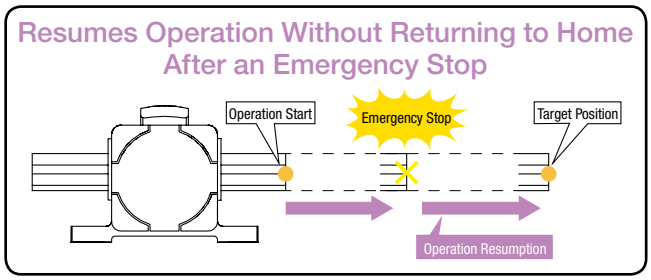
The home position can be easily set by pressing a switch on the front of the driver, which is saved by the absolute sensor. In addition, home setting is possible with the **MEXE02** support software or by using an external input signal.



Return-to-Home Not Required

(Built-in controller type)

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 a return-to-home when recovering from an emergency stop or a loss of power scenario.



Battery-Free

No battery is required because it is a mechanical-type sensor. Because positioning information is managed mechanically by the absolute sensor, the positioning information can be preserved, even if the power turns off, or if the cable between the motor and the driver are disconnected.*

Reduced Maintenance

Because there's no battery that needs replacing, maintenance time and costs can be reduced.

Unlimited Driver Installation Possibilities

Because there is no need to secure space for battery replacement, there are no restrictions on the installation location of the driver, improving the flexibility and freedom of the layout design of the control box.

Safe for Overseas Shipping

With normal batteries that self-discharge, care must be taken when the equipment requires a long shipping time, such as when being sent overseas. The absolute sensor does not require a battery, so there is no limit to how long the positioning information is maintained. In addition, there's no need to worry about various safety regulations, which must be taken into consideration when shipping a battery overseas.

Position Holding Even When the Cable Between the Motor and Driver is Detached*

Positioning information is stored within the absolute sensor.

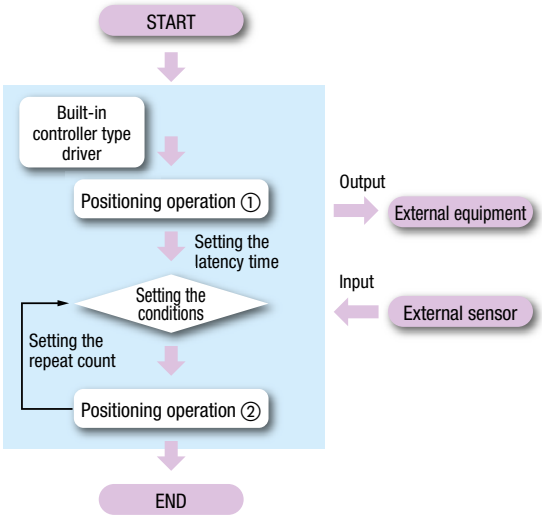
*Please note, the motor cabe must not be disconnected from the driver when the unit is live. Otherwise damage may occur.

The sequence function simplifies programs

(Available only on the built-in position function type)

By importing output signals for controlling other equipment or external input signals such as those from sensors, the **AZ** Series type can simplify sequence control programs.

- Number of positioning operation data items that can be set (up to 256 points)
- Number of general-purpose I/O points (9 points for input and 6 points for output)
- Number of communication I/O points (16 points for input and 16 points for output)

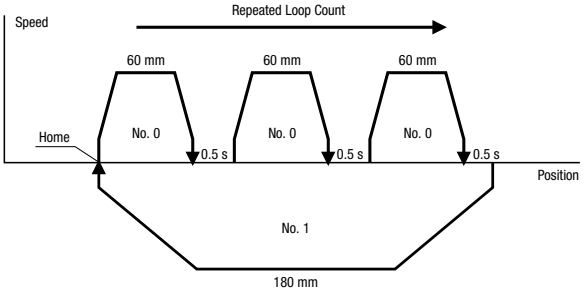


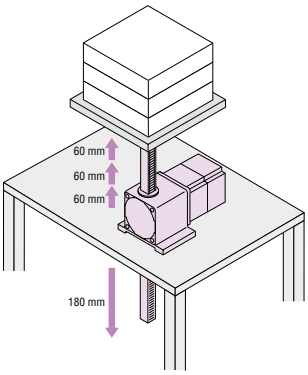
Examples of Loop Function-Assisted Operation

A loop function is a function in which the operation of the linked operation data number is repeated according to the set number of times.

Rack and Pinion Motor Product Name: **LM2F500AZMC-2**
Driver Product Name: **AZD-AD**
Application: Hoisting buckets

Operating Condition: Return to home after repeating 60 mm travel and 0.5 second stop three times.
Would like a simple method without using PLC.





Example of **MEXE02** Support Software Setting

Speed and travel amount are set as "Operating Data".

- Operating Data

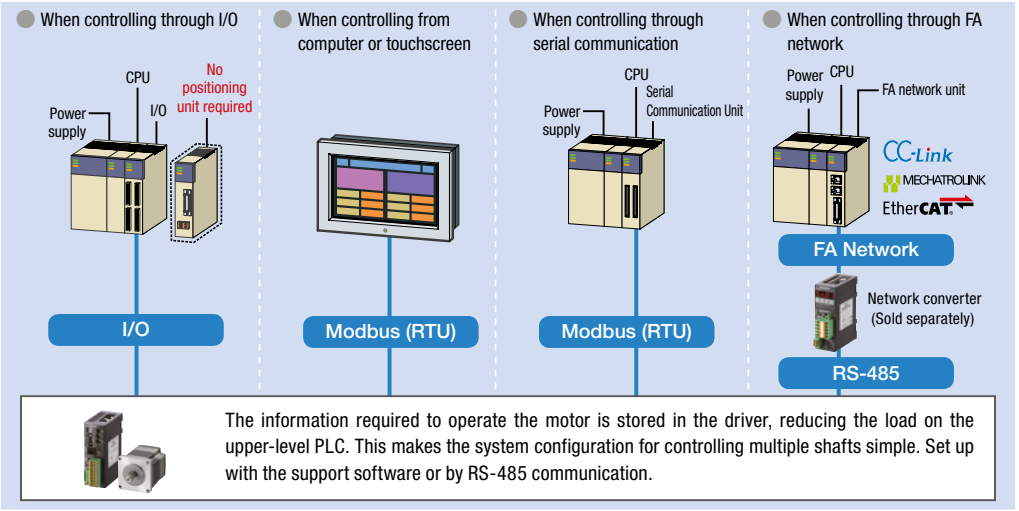
	Name	Operation type	Position [mm]	Speed [mm/s]	Acc	rrent [%]	Drive-complete delay time [s]	Link	Nex	th	Loop count	Loop offset	Loop end No.
#0		Incremental positioning (based on command position)	60.00	60.00		0	0.500	Automatic Sequential			loop 3{	0.00	}L-End
#1		Absolute positioning	0.00	60.00		0	0.000	No link			-	0.00	-

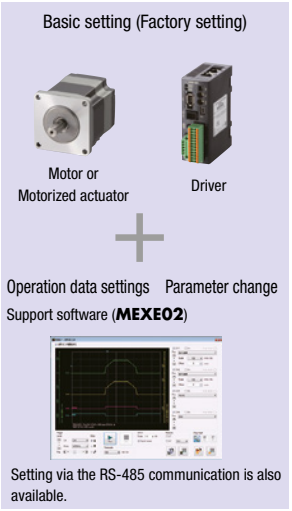
Traveling Amount Setting
Stop Time Setting
Repetition Count Setting

Available Drivers to suit a variety of host systems

Built-in Controller Type FLEX

Set the operating data in the driver, and the operating data is selected and executed from the host system. Host system connection and control is performed through I/O, Modbus (RTU), RS-485 communication, or FA network. The use of a network converter (sold separately) allows control via CC-Link communication, MECHATROLINK communication, or EtherCAT communication.

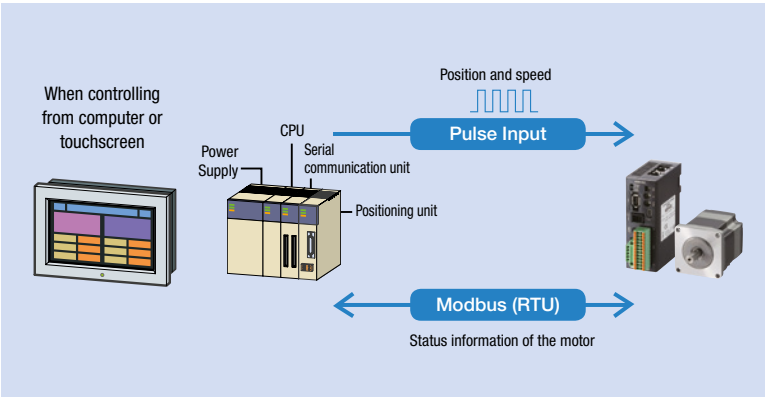


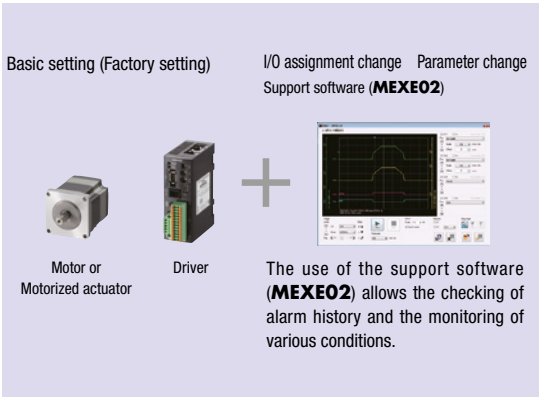


FLEX is a general term of the products that support I/O control, Modbus (RTU) control, and FA network control via a network converter.

Pulse Input Type with RS-485 Communication

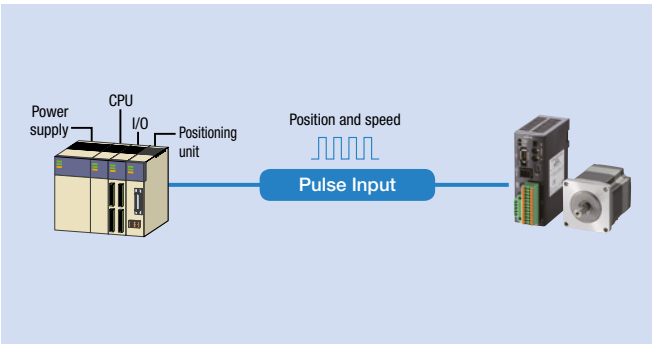
This type executes operation by inputting pulses to the driver. The motor is controlled from the positioning unit (pulse generator) provided by the customer. The use of RS-485 communication allows the monitoring of status information (position, speed, torque, alarms, temperature, etc.) of the motor.

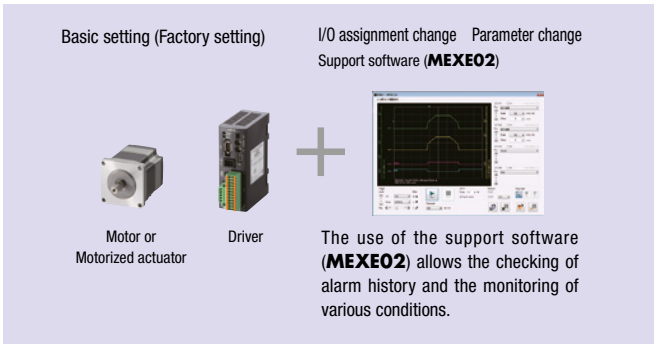




Pulse Input Type

This type executes operation by inputting pulses to the driver. The motor is controlled from the positioning unit (pulse generator) provided by the customer. The use of the support software (**MEXE02**) allows the checking of alarm history and the monitoring of various conditions.





- CC-Link and MECHATROLINK are the registered trademarks of the CC-Link Partner Association and the MECHATROLINK Members Association, respectively.
- EtherCAT is the registered trademark licensed by Beckhoff Automation in Germany.
- The support software (**MEXE02**) can be downloaded from the Oriental Motor website. The media is also available (for free).

Simple Operation with Support Software

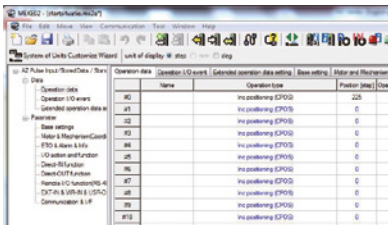
The support software enables data setting and verification of the actual drive by using a computer.

Support Software (**MEXE02**)

The support software can be downloaded from the website.

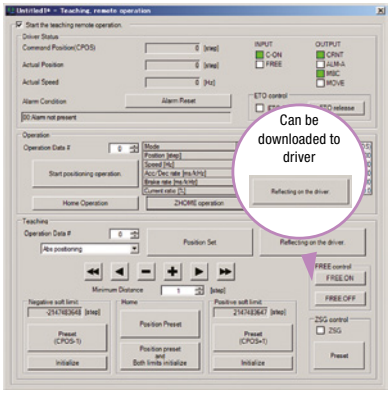
● Operating Data and Parameter Settings

Setting of operation data and parameters is easily performed via computer. Because the setting data can be saved, when the driver is replaced, the same settings can be used by downloading the saved data to the new driver.



● Teaching and Remote Operation

By using the data setting software and manual positioning, the operation command information can be downloaded to the driver. Use when setting up equipment.

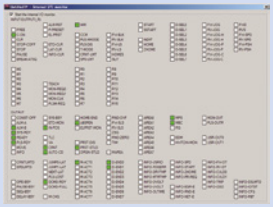


● Multi-monitoring enables remote operation and teaching while monitoring.

Various Monitoring Functions

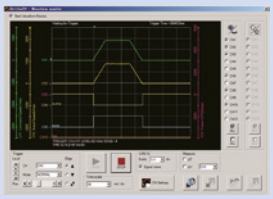
● I/O Monitoring

The status of I/O wiring to the driver can be verified by computer. This can be used for post-wiring I/O checks or I/O checks during operation.



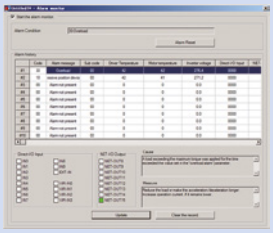
● Waveform Monitoring

The operational state of the motor (such as command speed and motor load factor), can be checked by an oscilloscope-like image. This can be used for equipment start-up and adjustment.



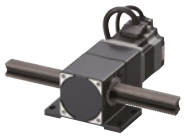
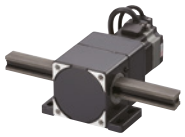
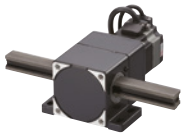
● Alarm Monitoring

When an abnormality occurs, the details of the abnormality and the solution can be checked.



Product Line

Rack and Pinion Motor

Frame Size [mm]	Type	Electromagnetic Brake	Travel Direction of Rack		Transportable Mass [kg]	Permissible Speed Range [mm/s]	Stroke [mm]
			Horizontal (**B** type)	Vertical (**F** type)			
60	High-Speed Type	Blank /Equipped			7	0～500	100～800
					10	0～250	
	High Transportable Mass Type				30	0～90	
80	High-Speed Type				7	0～500	100～1000
					20	0～250	
	High Transportable Mass Type				70	0～40	
					100	0～20	

Driver

Type
Built-in Controller FLEX  Single-Phase/ Three-Phase 200-240 VAC
Pulse Input with RS-485 Communication  Single-Phase/ Three-Phase 200-240 VAC
Pulse Input  Single-Phase/ Three-Phase 200-240 VAC