

Ezi-SPEED[®] EtherCAT[®]

BLDC Motor Speed Control System

- EtherCAT-compatible BLDC Motor Speed Control System
- CiA402 Drive Profile
- AC Power Supply Input (AC 200 ~ 240 V)
- Compact · Light Weight · High Power · High Efficiency Brushless Motor
- Wide Speed Range (50 ~ 4,000 r/min)
- Stable Speed Regulation ($\pm 0.2\%$)
- BLDC Motor Line-up (30, 60, 120, 200, 400 W)

CE



Fast Accurate Smooth Motion

Ezi-SPEED[®] EtherCAT[®]

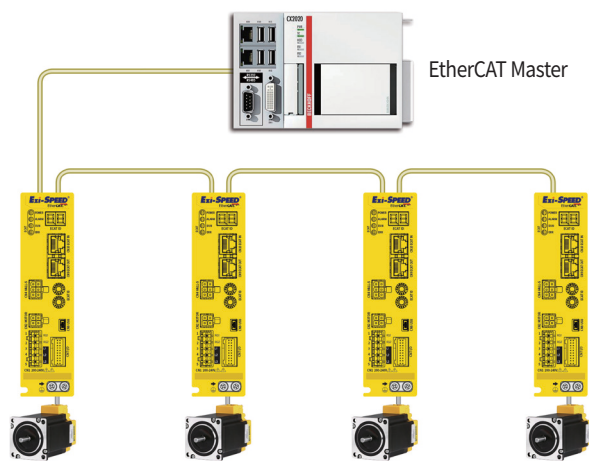
BLDC Motor Speed Control System



EtherCAT based Speed Control

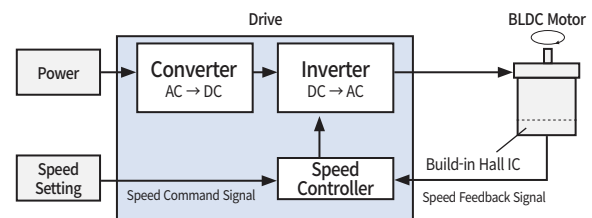
The Ezi-SPEED EtherCAT is a BLDC motor speed control system that supports EtherCAT, a fieldbus based on high-speed Ethernet (100 Mbps, full-duplex communication).

The Ezi-SPEED EtherCAT is an EtherCAT slave module that supports the CoE (CAN application protocol over EtherCAT) protocol. It operates in Velocity Mode, as defined in the CiA402 drive profile, or in Memory Map Mode, which is based on operational data.



BLDC Motor Unit

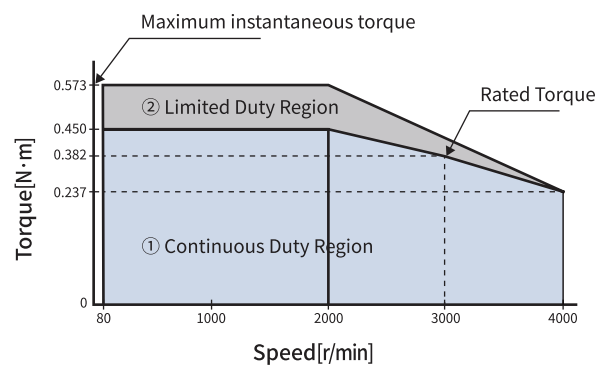
A conventional DC motor rotates using brushes and a commutator, requiring regular maintenance. In contrast, a BLDC (Brushless DC) motor operates without mechanical contacts, utilizing a semiconductor-based drive circuit, resulting in a longer lifespan and reduced maintenance requirements. Embedded permanent magnets in the rotor enhance efficiency, while automatic motor current control ensures consistent torque characteristics across all speed ranges. Additionally, utilizing Hall IC for feedback control allows precise speed regulation from low to high speed.



< Control Block Diagram >

The BLDC motor can operate continuously with a constant torque from low speeds to its rated rotational speed. Within the rated torque range, it maintains a stable rotational speed even when the load varies.

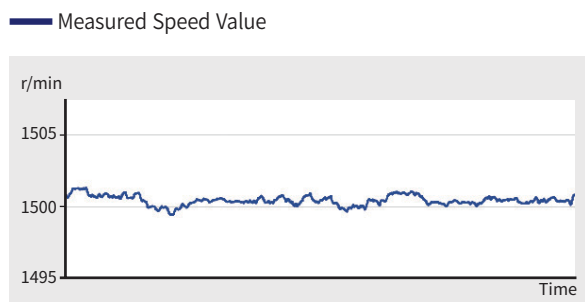
BLDC motors have two operating regions: continuous duty region (①) and limited duty region (②). The limited duty region is used for acceleration torque when starting an inertial load. However, operating in this region more than 40s activates the built-in overload protection function, which automatically prevents overheating of the motor and drive.



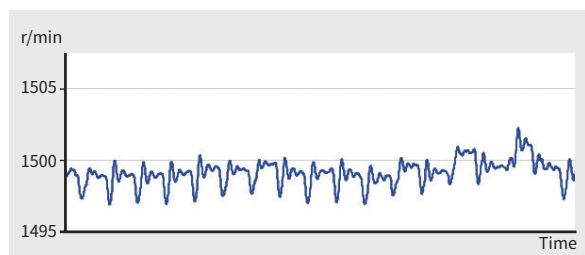
< Example of Torque Characteristics According to Speed of BLDC Motor >

High Precision Speed Control (Speed Regulation $\pm 2\%$)

Ezi-SPEED compares the setting speed with the speed feedback signals from the motor at all time, and adjusts the motor current using vector control algorithm. So, even if the load changes, stable rotation is maintained from low speed to high speed. Inverter-controlled AC induction motor does not perform feedback control, so the speed will be reduced significantly when load increases. Ezi-SPEED is recommended for applications that require stable speed.



Ezi-SPEED 120 W



Inverter + AC Induction Motor 100 W

- Load Factor: 95 %
- Setting Speed : 1,500 r/min
- Resolution of External Encoder for Measuring Velocity Ripple : 32,000 P/R

Wide Speed Control Range (Speed Ratio: 1:80)

Ezi-SPEED has wide speed control range compared to AC induction motor with inverter. Because torque is not restricted at low speed, Ezi-SPEED is recommended for application that requires stable torque over from low to high speed.

Product	Speed Control Range [r/min]	Speed Ratio
Ezi-SPEED	50 ~ 4,000	1:80
Inverter + AC Induction Motor	200 ~ 2,400	1:12

- Speed range of Inverter + AC Induction Motor varies depending on model type.

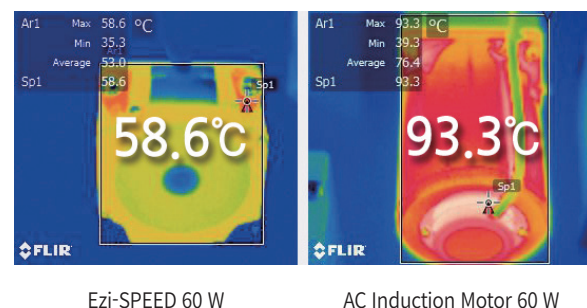
Compact / Light Weight / High Power / High Efficiency

Unlike AC induction motors, BLDC motors use permanent magnets in the rotor so that it could prevent secondary loss from rotor.

Therefore, BLDC motors has higher efficiency than inverter-controlled AC induction motor so that customers can save energy.

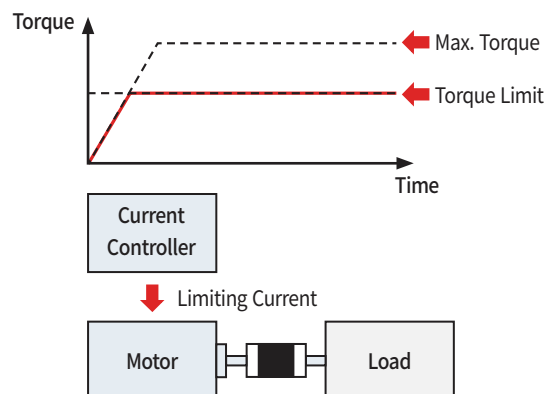


Comparison of motor temperature after 4 hours continuous operation when load factor is 100 % and Setting speed is 1,500 r/min.



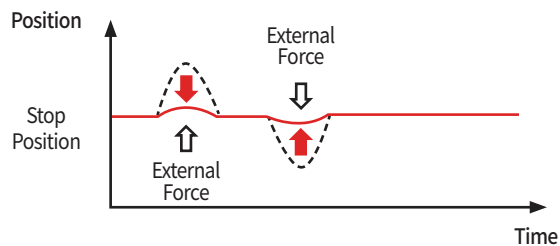
Torque Limit Function

Ezi-SPEED can control the torque limit by limiting the current flowing through the motor. Torque limit function can be used to prevent excessive force.



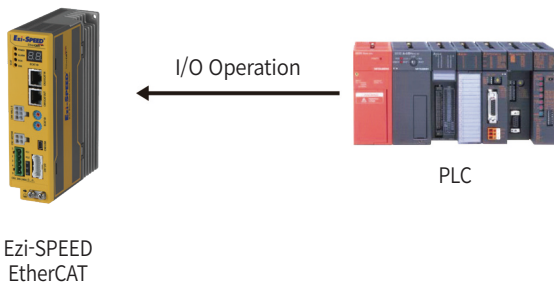
Load Holding Function

Load holding function can be used for an electrical retention brake at stop without the need for a mechanical brake. So, this function is suitable for applications that perform work while stopping the transportation conveyors.



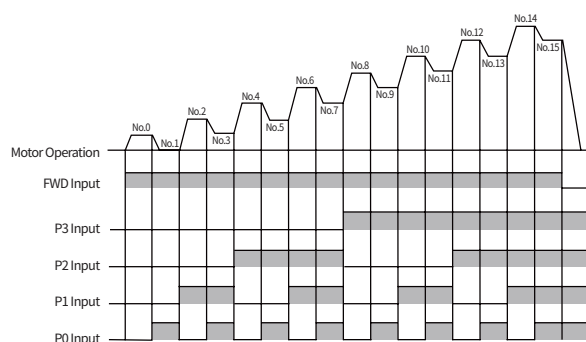
Operation by External I/O

A controller, such as a PLC, can perform operations such as starting, stopping, changing the direction of rotation and multi-speed operation by connecting external I/O. Additionally, the speed can be adjusted using analog input by connecting a potentiometer.



16-Speed Settings

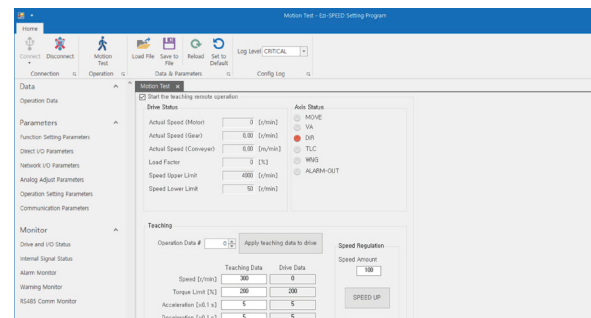
16-speed operation can be done by setting operation data No. 0 to No. 15. Operation data can be configured using Ezi-SPEED Setting program or through RS-485 communication.



Ezi-SPEED Setting program

Ezi-SPEED EtherCAT can perform various functions using the separately provided Ezi-SPEED Setting program.

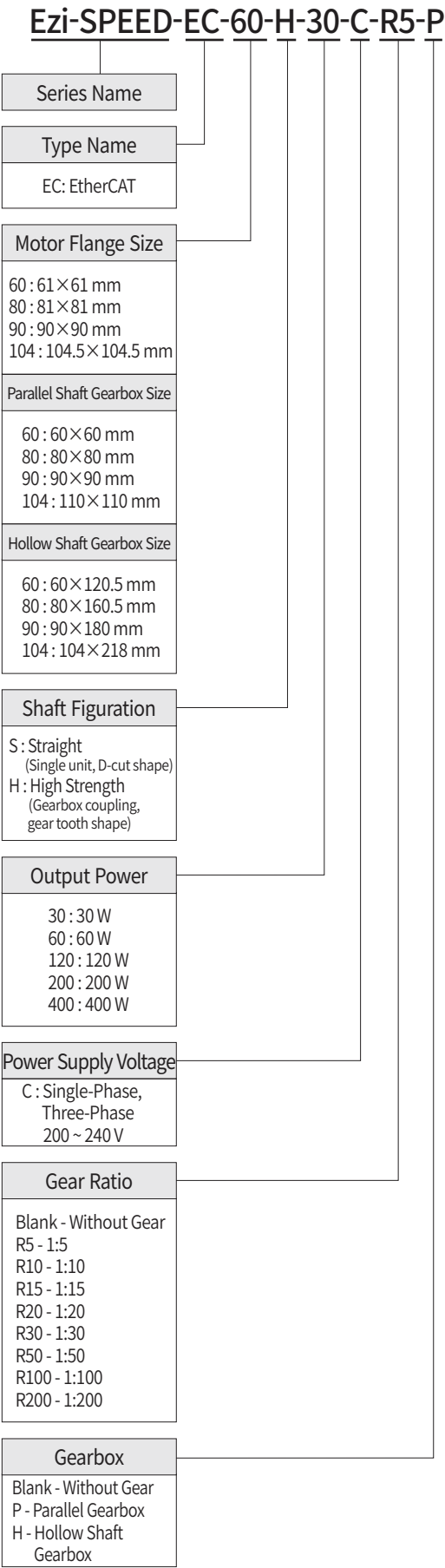
- **Parameter Setting Function:** Easily modify and save various parameters.
- **Monitoring Function:** Easily monitor the internal status of the drive and motor, including speed, load factor, I/O signals, alarms, and warnings.
- **Testing Function:** Easily test whether the drive and motor are operating correctly.



Protection Function

- Ezi-SPEED detects abnormal situations like overload, over voltage etc. When this happens, the operation is stopped and alarm is displayed.
- A regenerative resistor can be used when the deceleration time is short or when the large inertia load is used. Also the protection function can be activated for the excessive external force acting on the motor shaft.

Ezi-SPEED Part Numbering



Standard Combination

Output Power	Unit Part Number	Motor Model Number	Drive Model Number
30 W	Ezi-SPEED-EC-60-S-30-C	ESM-60-S-30	ESD-EC-30-C
60 W	Ezi-SPEED-EC-80-S-60-C	ESM-80-S-60	ESD-EC-60-C
120 W	Ezi-SPEED-EC-90-S-120-C	ESM-90-S-120	ESD-EC-120-C
200 W	Ezi-SPEED-EC-104-S-200-C	ESM-104-S-200	ESD-EC-200-C
400 W	Ezi-SPEED-EC-104-S-400-C	ESM-104-S-400	ESD-EC-400-C

Combination with Gearbox

Output Power	Unit Part Number	Motor Model Number	Drive Model Number	Gearbox Model Number	Gear Ratio	Output Power	Unit Part Number	Motor Model Number	Drive Model Number	Gearbox Model Number	Gear Ratio
30 W	Ezi-SPEED-EC-60-H-30-C-R5-P	ESM-60-H-30	ESD-EC-30-C	ESG-60-H-R5-P	1:5	200 W	Ezi-SPEED-EC-104-H-200-C-R5-P	ESM-104-H-200	ESD-EC-200-C	ESG-104-H-R5-P	1:5
	Ezi-SPEED-EC-60-H-30-C-R5-H			ESG-60-H-R5-H			ESG-104-H-R5-H				
	Ezi-SPEED-EC-60-H-30-C-R10-P			ESG-60-H-R10-P	1:10		Ezi-SPEED-EC-104-H-200-C-R10-P			ESG-104-H-R10-P	1:10
	Ezi-SPEED-EC-60-H-30-C-R10-H			ESG-60-H-R10-H			Ezi-SPEED-EC-104-H-200-C-R10-H			ESG-104-H-R10-H	
	Ezi-SPEED-EC-60-H-30-C-R15-P			ESG-60-H-R15-P	1:15		Ezi-SPEED-EC-104-H-200-C-R15-P			ESG-104-H-R15-P	1:15
	Ezi-SPEED-EC-60-H-30-C-R15-H			ESG-60-H-R15-H			Ezi-SPEED-EC-104-H-200-C-R15-H			ESG-104-H-R15-H	
	Ezi-SPEED-EC-60-H-30-C-R20-P			ESG-60-H-R20-P	1:20		Ezi-SPEED-EC-104-H-200-C-R20-P			ESG-104-H-R20-P	1:20
	Ezi-SPEED-EC-60-H-30-C-R20-H			ESG-60-H-R20-H			Ezi-SPEED-EC-104-H-200-C-R20-H			ESG-104-H-R20-H	
	Ezi-SPEED-EC-60-H-30-C-R30-P			ESG-60-H-R30-P	1:30		Ezi-SPEED-EC-104-H-200-C-R30-P			ESG-104-H-R30-P	1:30
	Ezi-SPEED-EC-60-H-30-C-R30-H			ESG-60-H-R30-H			Ezi-SPEED-EC-104-H-200-C-R30-H			ESG-104-H-R30-H	
	Ezi-SPEED-EC-60-H-30-C-R50-P			ESG-60-H-R50-P	1:50		Ezi-SPEED-EC-104-H-200-C-R50-P			ESG-104-H-R50-P	1:50
	Ezi-SPEED-EC-60-H-30-C-R50-H			ESG-60-H-R50-H			Ezi-SPEED-EC-104-H-200-C-R50-H			ESG-104-H-R50-H	
	Ezi-SPEED-EC-60-H-30-C-R100-P			ESG-60-H-R100-P	1:100		Ezi-SPEED-EC-104-H-200-C-R100-P			ESG-104-H-R100-P	1:100
	Ezi-SPEED-EC-60-H-30-C-R100-H			ESG-60-H-R100-H			Ezi-SPEED-EC-104-H-200-C-R100-H			ESG-104-H-R100-H	
	Ezi-SPEED-EC-60-H-30-C-R200-P			ESG-60-H-R200-P	1:200		Ezi-SPEED-EC-104-H-200-C-R200-P			ESG-104-H-R200-P	1:200
	Ezi-SPEED-EC-60-H-30-C-R200-H			ESG-60-H-R200-H							
60 W	Ezi-SPEED-EC-80-H-60-C-R5-P	ESM-80-H-60	ESD-EC-60-C	ESG-80-H-R5-P	1:5	400 W	Ezi-SPEED-EC-104-H-400-C-R5-P	ESM-104-H-400	ESD-EC-400-C	ESG-104-H-R5-P	1:5
	Ezi-SPEED-EC-80-H-60-C-R5-H			ESG-80-H-R5-H			ESG-104-H-R5-H				
	Ezi-SPEED-EC-80-H-60-C-R10-P			ESG-80-H-R10-P	1:10		Ezi-SPEED-EC-104-H-400-C-R10-P			ESG-104-H-R10-P	1:10
	Ezi-SPEED-EC-80-H-60-C-R10-H			ESG-80-H-R10-H			Ezi-SPEED-EC-104-H-400-C-R10-H			ESG-104-H-R10-H	
	Ezi-SPEED-EC-80-H-60-C-R15-P			ESG-80-H-R15-P	1:15		Ezi-SPEED-EC-104-H-400-C-R15-P			ESG-104-H-R15-P	1:15
	Ezi-SPEED-EC-80-H-60-C-R15-H			ESG-80-H-R15-H			Ezi-SPEED-EC-104-H-400-C-R15-H			ESG-104-H-R15-H	
	Ezi-SPEED-EC-80-H-60-C-R20-P			ESG-80-H-R20-P	1:20		Ezi-SPEED-EC-104-H-400-C-R20-P			ESG-104-H-R20-P	1:20
	Ezi-SPEED-EC-80-H-60-C-R20-H			ESG-80-H-R20-H			Ezi-SPEED-EC-104-H-400-C-R20-H			ESG-104-H-R20-H	
	Ezi-SPEED-EC-80-H-60-C-R30-P			ESG-80-H-R30-P	1:30		Ezi-SPEED-EC-104-H-400-C-R30-P			ESG-104-H-R30-P	1:30
	Ezi-SPEED-EC-80-H-60-C-R30-H			ESG-80-H-R30-H			Ezi-SPEED-EC-104-H-400-C-R30-H			ESG-104-H-R30-H	
	Ezi-SPEED-EC-80-H-60-C-R50-P			ESG-80-H-R50-P	1:50		Ezi-SPEED-EC-104-H-400-C-R50-P			ESG-104-H-R50-P	1:50
	Ezi-SPEED-EC-80-H-60-C-R50-H			ESG-80-H-R50-H			Ezi-SPEED-EC-104-H-400-C-R50-H			ESG-104-H-R50-H	
	Ezi-SPEED-EC-80-H-60-C-R100-P			ESG-80-H-R100-P	1:100		Ezi-SPEED-EC-104-H-400-C-R100-P			ESG-104-H-R100-P	1:100
	Ezi-SPEED-EC-80-H-60-C-R100-H			ESG-80-H-R100-H			Ezi-SPEED-EC-104-H-400-C-R100-H			ESG-104-H-R100-H	
	Ezi-SPEED-EC-80-H-60-C-R200-P			ESG-80-H-R200-P	1:200		Ezi-SPEED-EC-104-H-400-C-R200-P			ESG-104-H-R200-P	1:200
	Ezi-SPEED-EC-80-H-60-C-R200-H			ESG-80-H-R200-H							
120 W	Ezi-SPEED-EC-90-H-120-C-R5-P	ESM-90-H-120	ESD-EC-120-C	ESG-90-H-R5-P	1:5						
	Ezi-SPEED-EC-90-H-120-C-R5-H			ESG-90-H-R5-H							
	Ezi-SPEED-EC-90-H-120-C-R10-P			ESG-90-H-R10-P	1:10						
	Ezi-SPEED-EC-90-H-120-C-R10-H			ESG-90-H-R10-H							
	Ezi-SPEED-EC-90-H-120-C-R15-P			ESG-90-H-R15-P	1:15						
	Ezi-SPEED-EC-90-H-120-C-R15-H			ESG-90-H-R15-H							
	Ezi-SPEED-EC-90-H-120-C-R20-P			ESG-90-H-R20-P	1:20						
	Ezi-SPEED-EC-90-H-120-C-R20-H			ESG-90-H-R20-H							
	Ezi-SPEED-EC-90-H-120-C-R30-P			ESG-90-H-R30-P	1:30						
	Ezi-SPEED-EC-90-H-120-C-R30-H			ESG-90-H-R30-H							
	Ezi-SPEED-EC-90-H-120-C-R50-P			ESG-90-H-R50-P	1:50						
	Ezi-SPEED-EC-90-H-120-C-R50-H			ESG-90-H-R50-H							
	Ezi-SPEED-EC-90-H-120-C-R100-P			ESG-90-H-R100-P	1:100						
	Ezi-SPEED-EC-90-H-120-C-R100-H			ESG-90-H-R100-H							
	Ezi-SPEED-EC-90-H-120-C-R200-P			ESG-90-H-R200-P	1:200						
	Ezi-SPEED-EC-90-H-120-C-R200-H			ESG-90-H-R200-H							

Specifications of Drive

□: Motor flange size
■: Shaft figuration

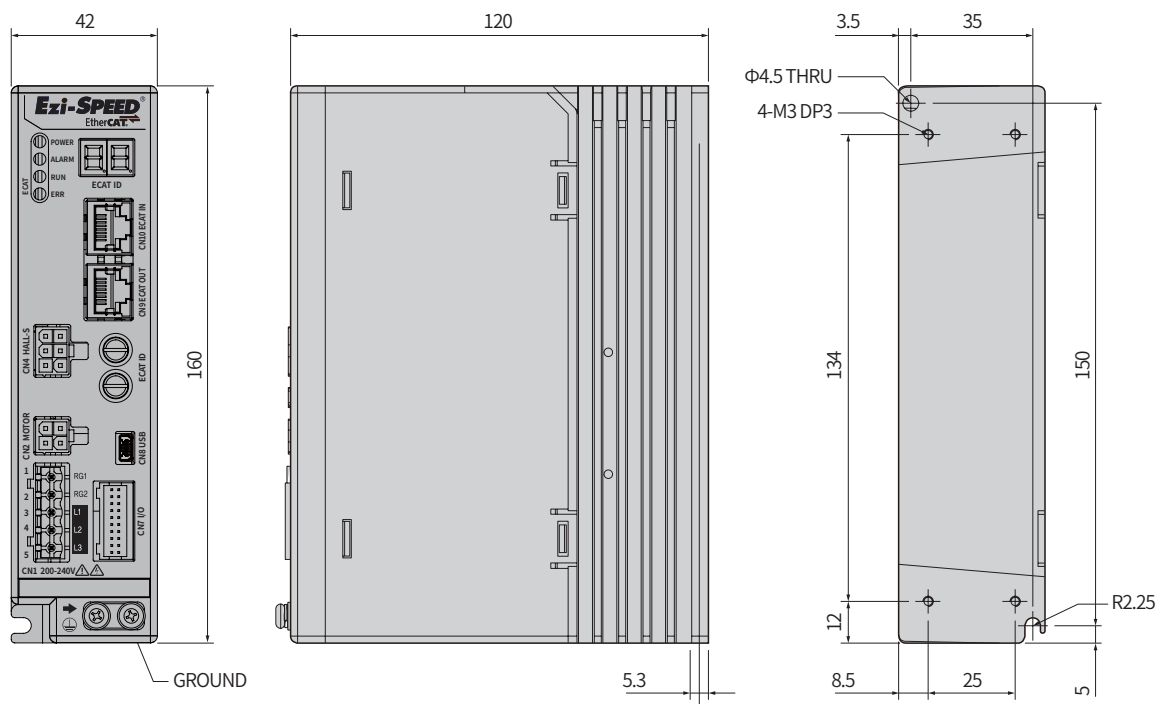
Model		Ezi-SPEED- EC-□-■-30	Ezi-SPEED- EC-□-■-60	Ezi-SPEED- EC-□-■-120	Ezi-SPEED- EC-□-■-200	Ezi-SPEED- EC-□-■-400
Rated Output Power (Continuous)		30 W	60 W	120 W	200 W	400 W
Power Supply	Rated Voltage	Single-phase 200 ~ 240 V / Three-phase 200 ~ 240 V				
	Rated Frequency	50/60 Hz $\pm$ 5 %				
	Rated Input Current	Single-Phase : 0.88 A Three-Phase : 0.51 A	Single-Phase : 1.55 A Three-Phase : 0.90 A	Single-Phase : 2.43 A Three-Phase : 1.41 A	Single-Phase : 3.42 A Three-Phase : 1.97 A	Single-Phase : 5.64 A Three-Phase : 3.26 A
	Maximum Input Current	Single-Phase : 1.9 A Three-Phase : 1.1 A	Single-Phase : 2.8 A Three-Phase : 1.7 A	Single-Phase : 4.5 A Three-Phase : 2.6 A	Single-Phase : 5.47 A Three-Phase : 3.16 A	Single-Phase : 7.85 A Three-Phase : 4.53 A
Rated Phase Current		0.21 A	0.36 A	0.85 A	1.65 A	2.37 A
Rated Torque		0.096 N·m	0.191 N·m	0.382 N·m	0.637 N·m	1.27 N·m
Maximum Instantaneous Torque		0.144 N·m	0.287 N·m	0.573 N·m	1.15 N·m	1.91 N·m
Rated Speed		3,000 r/min				
Speed Control Range		50 ~ 4,000 r/min				
Speed Regulation		$\pm$ 0.2 % or less / Conditions : 0~Rated Torque, Rated Speed, Rated Voltage, Normal Temperature				
Digital Input		7 programmable inputs				
Digital Output		2 programmable outputs				

EtherCAT Communication Specification

Item		Specification
Communication Specification		IEC 61158 Type12, IEC 61800-7 CiA402 Drive Profile
Physical Layer		100 BASE-TX (IEEE 802.3)
Connector		· RJ45×2 (shielded compatible) · ECAT IN: EtherCAT input · ECAT OUT: EtherCAT output
Communication Cable		Category 5e (Cat 5e) or higher, STP (Shielded twisted pair) Ethernet cable
Transmission Speed		100 Mbps
Communication Distance		Distance between nodes: Within 100 m
Node Address Setting		Using EtherCAT ID switches or configuration tools: · Via EtherCAT ID switches: 1 ~ 99 ^{*1} · Via configuration tools: 1 ~ 65,535
Communication Cycle		0.25 ms or more
Topology		· Line (configured by the product) · Ring (require a supported master) · Tree, Star (require EtherCAT switching hub)
Protocol		· PDO (Process Data Object) · SDO (Service Data Object)
Supported Communication Protocols		· CoE (CANopen application protocol over EtherCAT) · FoE (File access over EtherCAT)
Mode	Asynchronous	· Free Run Mode
	Synchronous	· SM2 Event Mode · DC (Distributed Clock) Sync Event Mode
Process Data		Configurable PDO Mapping
Sync Manager		· SM0: Mailbox output · SM1: Mailbox input · SM2: Process data output · SM3: Process data input
Mailbox (CoE)		· SDO Request · SDO Response · SDO Information · Diagnosis History
CiA402 Drive Profile		· VL: Velocity mode · MAP: IO-Map Command mode

*1: Node addresses above 100 can be set through internal parameters.

Dimensions of Drive [mm]

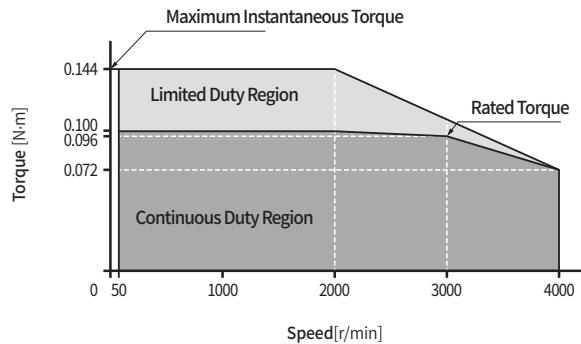


Specifications of Motor

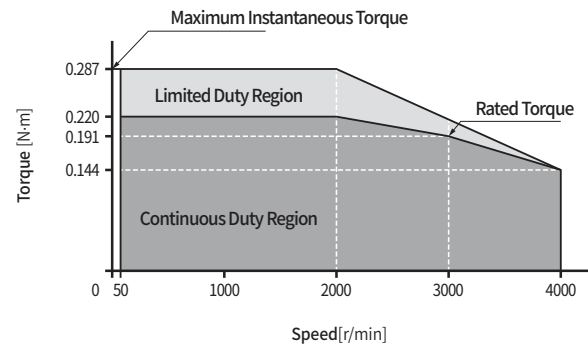
Model				ESM-60-S-30	ESM-80-S-60	ESM-90-S-120	ESM-104-S-200	ESM-104-S-400
			Unit					
Rated Output Power (Continuous)			W	30	60	120	200	400
Rated Torque			N·m	0.096	0.192	0.382	0.637	1.272
Maximum Instantaneous Torque			N·m	0.144	0.287	0.573	1.15	1.91
Rated Input Phase Current			A	0.21	0.36	0.85	1.65	2.37
Rated Speed			r/min	3,000				
Permissible Load Inertia Moment			10 ⁻⁴ kg·m ²	0.5	1.8	5.8	5.8	8.75
Inertia Moment			10 ⁻⁴ kg·m ²	0.086	0.234	0.61	0.61	0.66
Weight			kg	0.5	0.8	1.3	2.4	2.4
Length			mm	62	74	94	156	156
Permissible Radial Load	Distance from End of Shaft	10 mm	N	70	120	160	197	197
		20 mm		100	140	170	220	220
Permissible Axial Load			N	Use at half or less of the motor unit's weight				
Insulation Resistance			MΩ	100 MΩ or more (between motor coil and casing under DC 500 V)				
Insulation Class			-	EN: class B (130 °C)				
Protection Class			-	IP65 (excluding output shaft section)				

Torque Characteristics of Motor

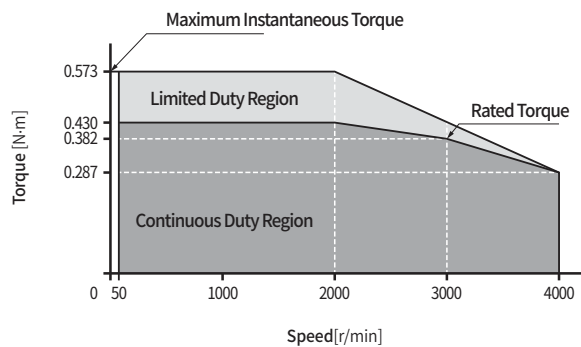
Ezi-SPEED-30 W



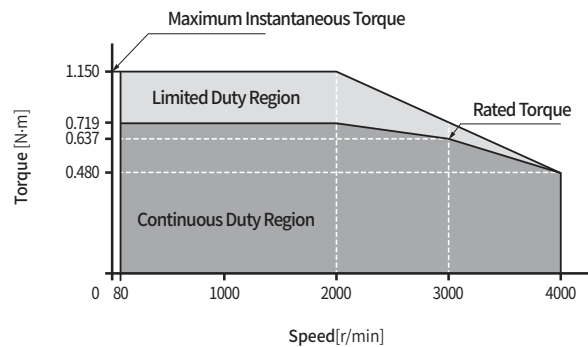
Ezi-SPEED-60 W



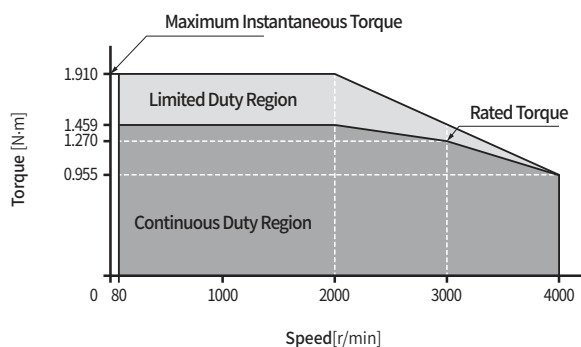
Ezi-SPEED-120 W



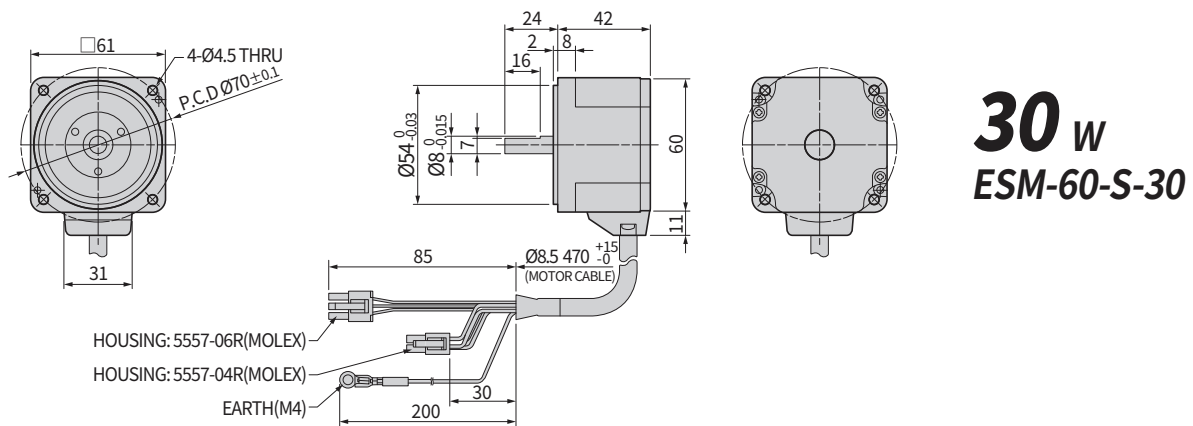
Ezi-SPEED-200 W



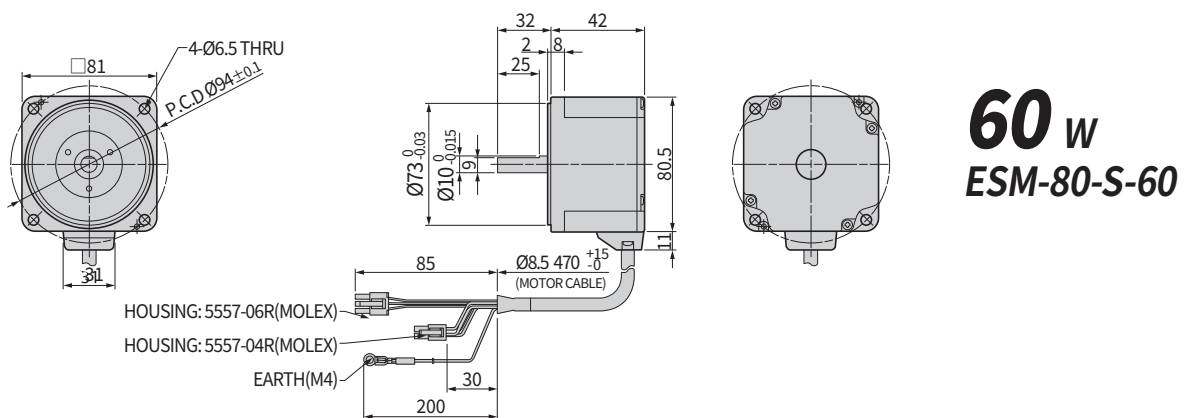
Ezi-SPEED-400 W



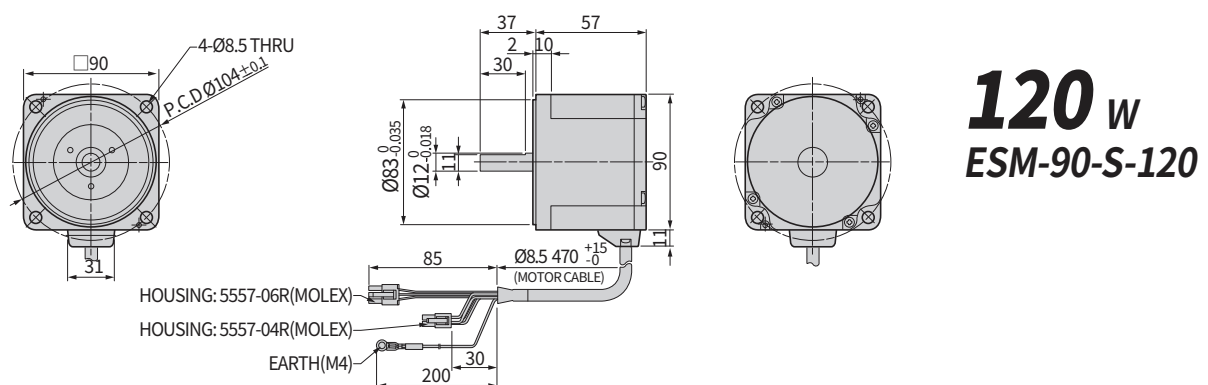
Dimensions of Motor [mm]



30_W
ESM-60-S-30

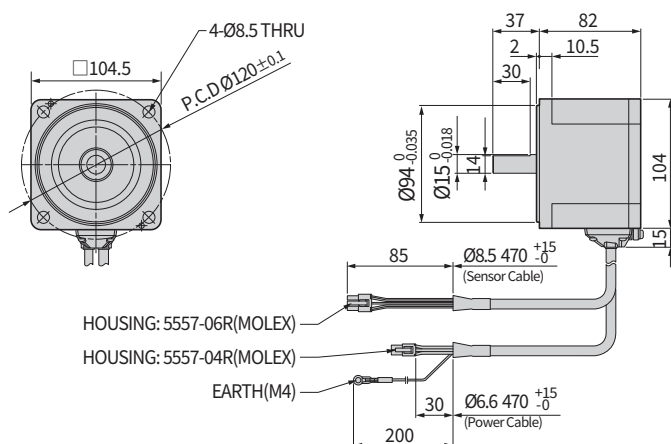


60_W
ESM-80-S-60

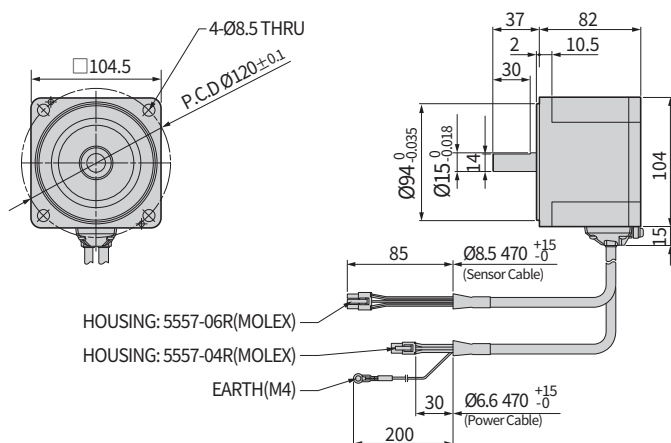


120_W
ESM-90-S-120

Dimensions of Motor [mm]



200_W
ESM-104-S-200



400_W
ESM-104-S-400

Specifications of Motor with Parallel Shaft Gearbox

30_w

Unit Part Number	Gear Ratio	Permissible Torque [N·m]		Permissible Speed Range [r/min]	Unit Weight [kg]	Permissible Radial Load [N]		Permissible Axial Load [N]
		50 ~ 3,000 [r/min]	4,000 [r/min]			Distance from End of Shaft [mm]		
						10	20	
Ezi-SPEED-EC-60-H-30-C-R5-P	5	0.45	0.34	10 ~ 800	0.9	100	150	40
Ezi-SPEED-EC-60-H-30-C-R10-P	10	0.9	0.68	5 ~ 400		150	200	
Ezi-SPEED-EC-60-H-30-C-R15-P	15	1.35	1	3.3 ~ 266.7				
Ezi-SPEED-EC-60-H-30-C-R20-P	20	1.8	1.4	2.5 ~ 200				
Ezi-SPEED-EC-60-H-30-C-R30-P	30	2.6	1.9	1.7 ~ 133.3				
Ezi-SPEED-EC-60-H-30-C-R50-P	50	4.3	3.2	1 ~ 80				
Ezi-SPEED-EC-60-H-30-C-R100-P	100	6	5.4	0.5 ~ 40				
Ezi-SPEED-EC-60-H-30-C-R200-P	200	6	5.4	0.25 ~ 20				

60_w

Unit Part Number	Gear Ratio	Permissible Torque [N·m]		Permissible Speed Range [r/min]	Unit Weight [kg]	Permissible Radial Load [N]		Permissible Axial Load [N]
		50 ~ 3,000 [r/min]	4,000 [r/min]			Distance from End of Shaft [mm]		
						10	20	
Ezi-SPEED-EC-80-H-60-C-R5-P	5	0.9	0.68	10 ~ 800	1.6	200	250	100
Ezi-SPEED-EC-80-H-60-C-R10-P	10	1.8	1.4	5 ~ 400		300	350	
Ezi-SPEED-EC-80-H-60-C-R15-P	15	2.7	2	3.3 ~ 266.7				
Ezi-SPEED-EC-80-H-60-C-R20-P	20	3.6	2.7	2.5 ~ 200		450	550	
Ezi-SPEED-EC-80-H-60-C-R30-P	30	5.2	3.9	1.7 ~ 133.3				
Ezi-SPEED-EC-80-H-60-C-R50-P	50	8.6	6.5	1 ~ 80				
Ezi-SPEED-EC-80-H-60-C-R100-P	100	16	12.9	0.5 ~ 40				
Ezi-SPEED-EC-80-H-60-C-R200-P	200	16	14	0.25 ~ 20				

Specifications of Motor with Parallel Shaft Gearbox

120_W

Unit Part Number	Gear Ratio	Permissible Torque [N·m]		Permissible Speed Range [r/min]	Unit Weight [kg]	Permissible Radial Load [N]		Permissible Axial Load [N]
		50 ~ 3,000 [r/min]	4,000 [r/min]			Distance from End of Shaft [mm]		
						10	20	
Ezi-SPEED-EC-90-H-120-C-R5-P	5	2.2	1.4	10 ~ 800	2.7	300	400	150
Ezi-SPEED-EC-90-H-120-C-R10-P	10	4.4	2.7	5 ~ 400		400	500	
Ezi-SPEED-EC-90-H-120-C-R15-P	15	6.6	4.1	3.3 ~ 266.7				
Ezi-SPEED-EC-90-H-120-C-R20-P	20	8.8	5.4	2.5 ~ 200				
Ezi-SPEED-EC-90-H-120-C-R30-P	30	12.6	7.7	1.7 ~ 133.3				
Ezi-SPEED-EC-90-H-120-C-R50-P	50	21.1	12.9	1 ~ 80				
Ezi-SPEED-EC-90-H-120-C-R100-P	100	30	25.8	0.5 ~ 40				
Ezi-SPEED-EC-90-H-120-C-R200-P	200	30	27	0.25 ~ 20				

200_W

Unit Part Number	Gear Ratio	Permissible Torque [N·m]		Permissible Speed Range [r/min]	Unit Weight [kg]	Permissible Radial Load [N]		Permissible Axial Load [N]
		50 ~ 3,000 [r/min]	4,000 [r/min]			Distance from End of Shaft [mm]		
						10	20	
Ezi-SPEED-EC-104-H-200-C-R5-P	5	2.9	2	10 ~ 800	4.2	550	800	200
Ezi-SPEED-EC-104-H-200-C-R10-P	10	5.9	4.1	5 ~ 400				
Ezi-SPEED-EC-104-H-200-C-R15-P	15	8.8	6.1	3.3 ~ 266.7				
Ezi-SPEED-EC-104-H-200-C-R20-P	20	11.7	8.1	2.5 ~ 200		1,000	1,250	300
Ezi-SPEED-EC-104-H-200-C-R30-P	30	16.8	11.6	1.7 ~ 133.3				
Ezi-SPEED-EC-104-H-200-C-R50-P	50	28	19.4	1 ~ 80				
Ezi-SPEED-EC-104-H-200-C-R100-P	100	52.7	36.5	0.5 ~ 40		1,400	1,700	400
Ezi-SPEED-EC-104-H-200-C-R200-P	200	70	63	0.25 ~ 20				

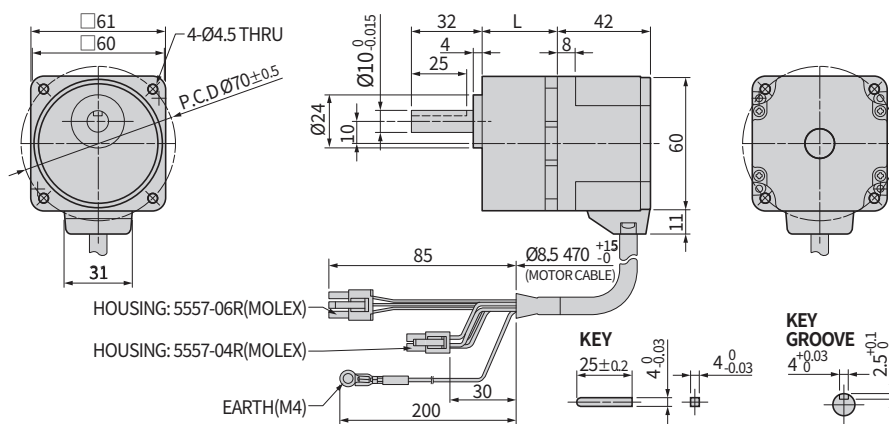
Specifications of Motor with Parallel Shaft Gearbox

400_W

Unit Part Number	Gear Ratio	Permissible Torque [N·m]		Permissible Speed Range [r/min]	Unit Weight [kg]	Permissible Radial Load [N]		Permissible Axial Load [N]
		50 ~ 3,000 [r/min]	4,000 [r/min]			Distance from End of Shaft [mm]		
						10	20	
Ezi-SPEED-EC-104-H-400-C-R5-P	5	5.9	4.3	10 ~ 800	4.2	550	800	200
Ezi-SPEED-EC-104-H-400-C-R10-P	10	11.7	8.6	5 ~ 400				
Ezi-SPEED-EC-104-H-400-C-R15-P	15	17.6	12.8	3.3 ~ 266.7				
Ezi-SPEED-EC-104-H-400-C-R20-P	20	23.4	17.1	2.5 ~ 200				
Ezi-SPEED-EC-104-H-400-C-R30-P	30	33.5	24.5	1.7 ~ 133.3		1,000	1,250	300
Ezi-SPEED-EC-104-H-400-C-R50-P	50	55.9	40.9	1 ~ 80				
Ezi-SPEED-EC-104-H-400-C-R100-P	100	70	63	0.5 ~ 40				
Ezi-SPEED-EC-104-H-400-C-R200-P	200	70	63	0.25 ~ 20				

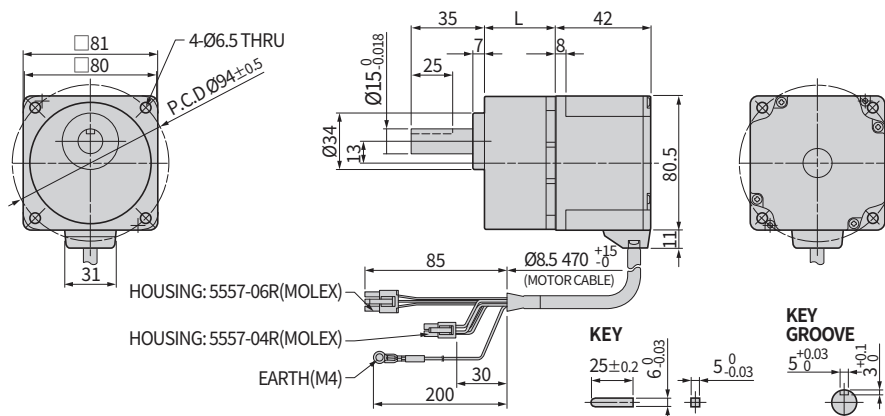
30_w

Unit Part Number	Gearbox Part Number	 Gear Ratio	Mounting Bolt	L [mm]
Ezi-SPEED-EC-60-H-30-C-R  -P	ESG-60-H-R  -P	5, 10, 15, 20	M4×50	34
		30, 50, 100	M4×55	38
		200	M4×60	43



60_w

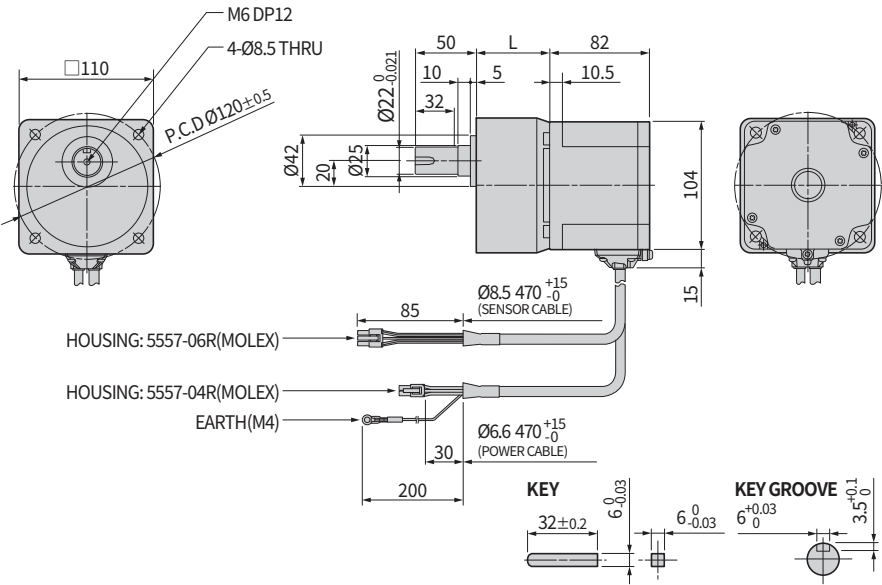
Unit Part Number	Gearbox Part Number	 Gear Ratio	Mounting Bolt	L [mm]
Ezi-SPEED-EC-80-H-60-C-R  -P	ESG-80-H-R  -P	5, 10, 15, 20	M4×65	41
		30, 50, 100	M4×70	46
		200	M4×75	51



Dimensions of Motor with Parallel Shaft Gearbox [mm]

400_w

Unit Part Number	Gearbox Part Number	 Gear Ratio	Mounting Bolt	L [mm]
Ezi-SPEED-EC-104-H-400-C-R  -P	ESG-104-H-R  -P	5, 10, 15, 20	M8×95	60
		30, 50	M8×110	72
		100, 200	M8×120	86



Specifications of Motor with Hollow Shaft Gearbox

30_w

Unit Part Number	Gear Ratio	Permissible Torque [N·m]		Permissible Speed Range [r/min]	Unit Weight [kg]	Permissible Radial Load [N]		Permissible Axial Load [N]
		50 ~ 3,000 [r/min]	4,000 [r/min]			Distance from End of Shaft [mm]		
						10	20	
Ezi-SPEED-EC-60-H-30-C-R5-H	5	0.4	0.3	10 ~ 800	1.2	450	370	200
Ezi-SPEED-EC-60-H-30-C-R15-H	10	0.85	0.64	5 ~ 400		500	400	
Ezi-SPEED-EC-60-H-30-C-R15-H	15	1.3	0.96	3.3 ~ 266.7				
Ezi-SPEED-EC-60-H-30-C-R20-H	20	1.7	1.3	2.5 ~ 200				
Ezi-SPEED-EC-60-H-30-C-R30-H	30	2.6	1.9	1.7 ~ 133.3				
Ezi-SPEED-EC-60-H-30-C-R50-H	50	4.3	3.2	1 ~ 80				
Ezi-SPEED-EC-60-H-30-C-R100-H	100	8.5	6.4	0.5 ~ 40				
Ezi-SPEED-EC-60-H-30-C-R200-H	200	17	12.8	0.25 ~ 20				

60_w

Unit Part Number	Gear Ratio	Permissible Torque [N·m]		Permissible Speed Range [r/min]	Unit Weight [kg]	Permissible Radial Load [N]		Permissible Axial Load [N]	
		50 ~ 3,000 [r/min]	4,000 [r/min]			Distance from End of Shaft [mm]			
						10	20		
Ezi-SPEED-EC-80-H-60-C-R5-H	5	0.85	0.64	10 ~ 800	2.2	800	660	400	
Ezi-SPEED-EC-80-H-60-C-R10-H	10	1.7	1.3	5 ~ 400					
Ezi-SPEED-EC-80-H-60-C-R15-H	15	2.6	1.9	3.3 ~ 266.7		1,200	1,000		
Ezi-SPEED-EC-80-H-60-C-R20-H	20	3.4	2.6	2.5 ~ 200					
Ezi-SPEED-EC-80-H-60-C-R30-H	30	5.1	3.8	1.7 ~ 133.3					
Ezi-SPEED-EC-80-H-60-C-R50-H	50	8.5	6.4	1 ~ 80					
Ezi-SPEED-EC-80-H-60-C-R100-H	100	17	12.8	0.5 ~ 40					
Ezi-SPEED-EC-80-H-60-C-R200-H	200	34	25.5	0.25 ~ 20					

Specifications of Motor with Hollow Shaft Gearbox

120_W

Unit Part Number	Gear Ratio	Permissible Torque [N·m]		Permissible Speed Range [r/min]	Unit Weight [kg]	Permissible Radial Load [N]		Permissible Axial Load [N]
		50 ~ 3,000 [r/min]	4,000 [r/min]			Distance from End of Shaft [mm]		
						10	20	
Ezi-SPEED-EC-90-H-120-C-R5-H	5	2.1	1.3	10 ~ 800	3.3	900	770	500
Ezi-SPEED-EC-90-H-120-C-R10-H	10	4.2	2.6	5 ~ 400				
Ezi-SPEED-EC-90-H-120-C-R15-H	15	6.2	3.8	3.3 ~ 266.7		1,300	1,000	
Ezi-SPEED-EC-90-H-120-C-R20-H	20	8.3	5.1	2.5 ~ 200				
Ezi-SPEED-EC-90-H-120-C-R30-H	30	12.5	7.7	1.7 ~ 133.3		1,500	1,280	
Ezi-SPEED-EC-90-H-120-C-R50-H	50	21	12.8	1 ~ 80				
Ezi-SPEED-EC-90-H-120-C-R100-H	100	42	25.5	0.5 ~ 40				
Ezi-SPEED-EC-90-H-120-C-R200-H	200	68	51	0.25 ~ 20				

200_W

Unit Part Number	Gear Ratio	Permissible Torque [N·m]		Permissible Speed Range [r/min]	Unit Weight [kg]	Permissible Radial Load [N]		Permissible Axial Load [N]	
		50 ~ 3,000 [r/min]	4,000 [r/min]			Distance from End of Shaft [mm]			
						10	20		
Ezi-SPEED-EC-104-H-200-C-R5-H	5	2.8	1.9	10 ~ 800	4.2	1,230	1,070	800	
Ezi-SPEED-EC-104-H-200-C-R10-H	10	5.5	3.8	5 ~ 400					
Ezi-SPEED-EC-104-H-200-C-R15-H	15	8.3	5.7	3.3 ~ 266.7		1,680	1,470		
Ezi-SPEED-EC-104-H-200-C-R20-H	20	11.1	7.7	2.5 ~ 200					
Ezi-SPEED-EC-104-H-200-C-R30-H	30	16.6	11.5	1.7 ~ 133.3		2,040	1,780		
Ezi-SPEED-EC-104-H-200-C-R50-H	50	27.6	19.1	1 ~ 80					
Ezi-SPEED-EC-104-H-200-C-R100-H	100	55.3	38.3	0.25 ~ 20					

Specifications of Motor with Hollow Shaft Gearbox

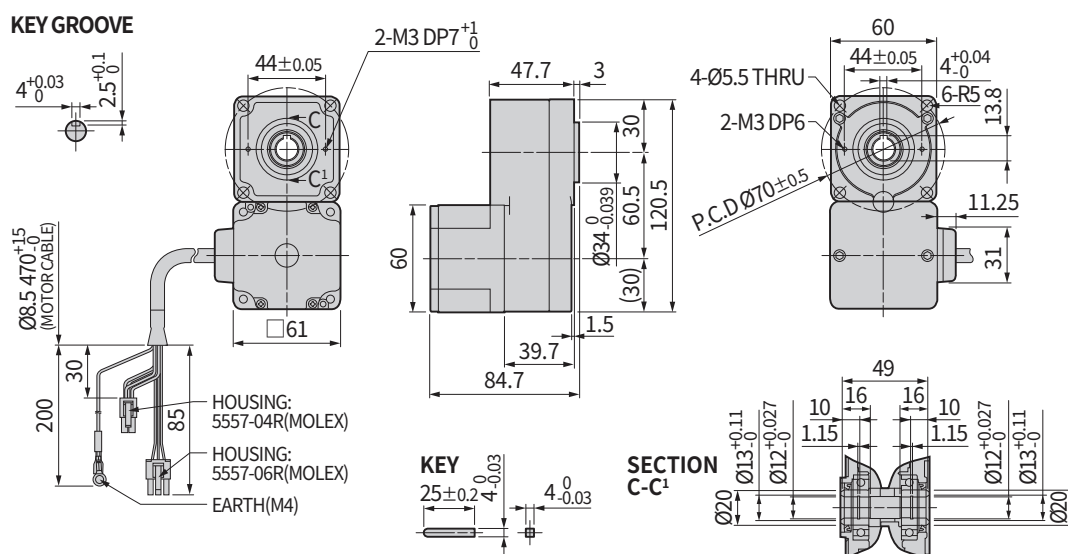
400_w

Unit Part Number	Gear Ratio	Permissible Torque [N·m]		Permissible Speed Range [r/min]	Unit Weight [kg]	Permissible Radial Load [N]		Permissible Axial Load [N]
		50 ~ 3,000 [r/min]	4,000 [r/min]			Distance from End of Shaft [mm]		
						10	20	
Ezi-SPEED-EC-104-H-400-C-R5-H	5	5.5	4.0	10 ~ 800	4.2	1,230	1,070	800
Ezi-SPEED-EC-104-H-400-C-R10-H	10	11.1	8.1	5 ~ 400				
Ezi-SPEED-EC-104-H-400-C-R15-H	15	16.6	12.1	3.3 ~ 266.7		1,680	1,470	
Ezi-SPEED-EC-104-H-400-C-R20-H	20	22.1	16.2	2.5 ~ 200				
Ezi-SPEED-EC-104-H-400-C-R30-H	30	33.2	24.2	1.7 ~ 133.3		2,040	1,780	
Ezi-SPEED-EC-104-H-400-C-R50-H	50	55.3	40.4	1 ~ 80				
Ezi-SPEED-EC-104-H-400-C-R100-H	100	110	80.8	0.5 ~ 40				

Dimensions of Motor with Hollow Shaft Gearbox [mm]

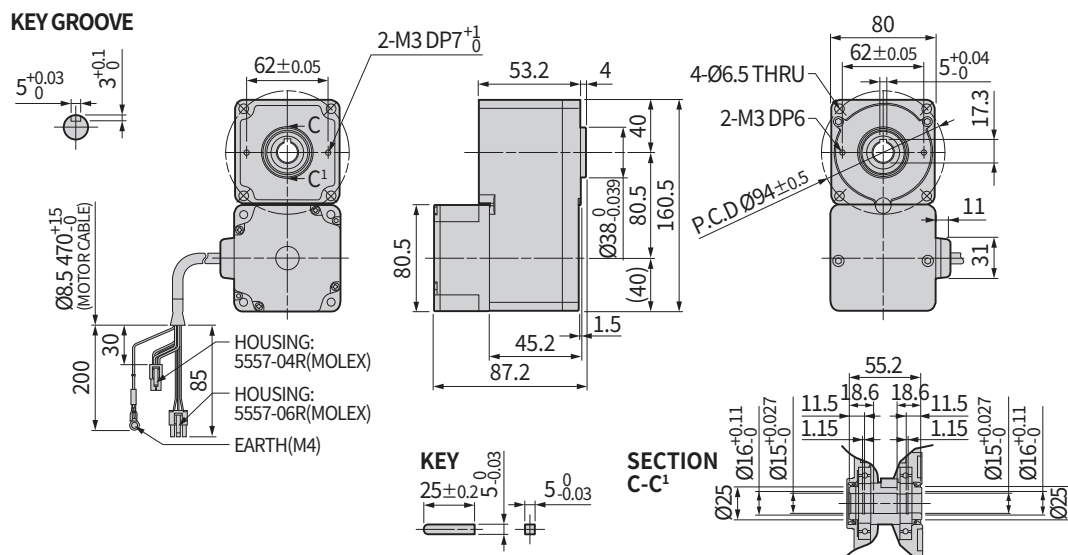
30_W

Unit Part Number	Gearbox Part Number	□ Gear Ratio	Mounting Bolt
Ezi-SPEED-EC-60-H-30-C-R□-H	ESG-60-H-R□-H	5, 10, 15, 20, 30, 50, 100, 200	M5×65



60_W

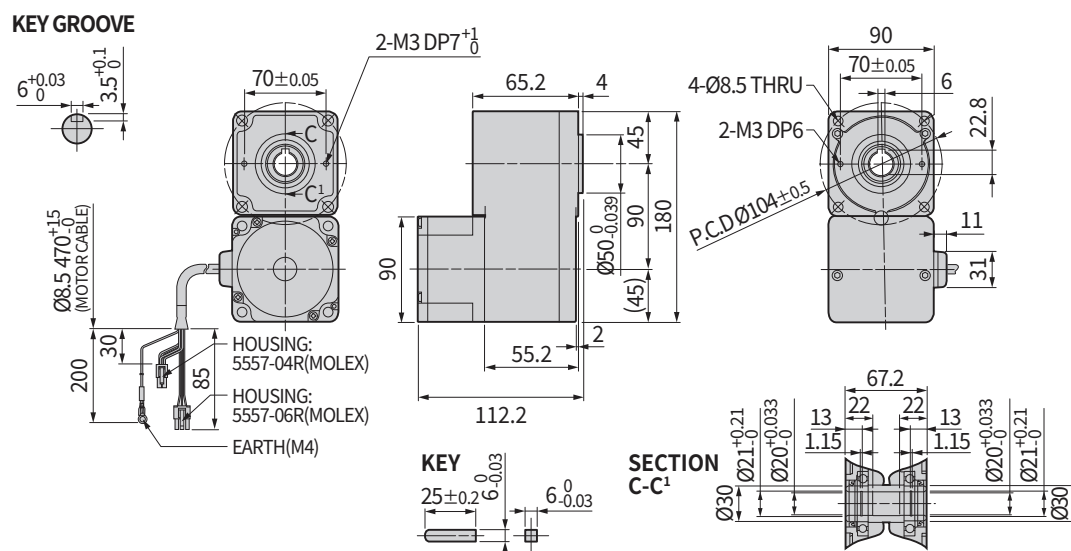
Unit Part Number	Gearbox Part Number	□ Gear Ratio	Mounting Bolt
Ezi-SPEED-EC-80-H-60-C-R□-H	ESG-80-H-R□-H	5, 10, 15, 20, 30, 50, 100, 200	M6×70



Dimensions of Motor with Hollow Shaft Gearbox [mm]

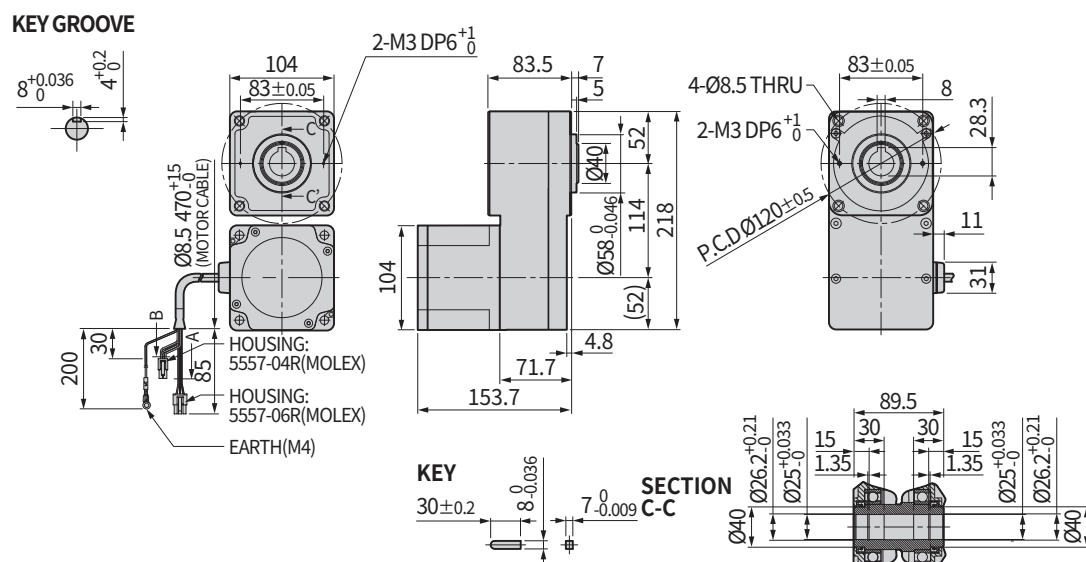
120_W

Unit Part Number	Gearbox Part Number	□ Gear Ratio	Mounting Bolt
Ezi-SPEED-EC-90-H-120-C-R□-H	ESG-90-H-R□-H	5, 10, 15, 20, 30, 50, 100, 200	M8×90



200_W

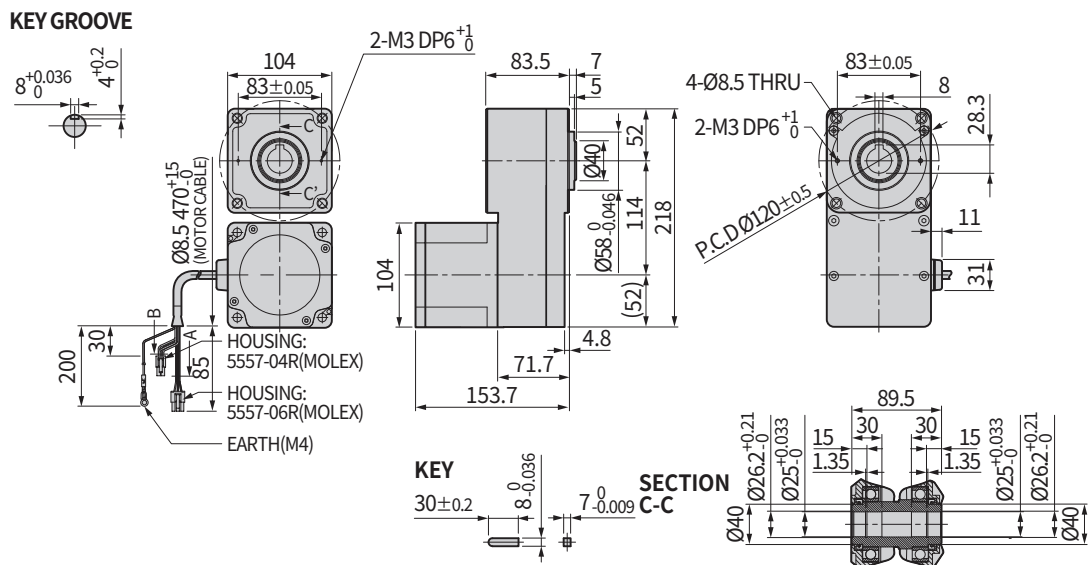
Unit Part Number	Gearbox Part Number	□ Gear Ratio	Mounting Bolt
Ezi-SPEED-EC-104-H-200-C-R□-H	ESG-104-H-R□-H	5, 10, 15, 20, 30, 50, 100	M8×90



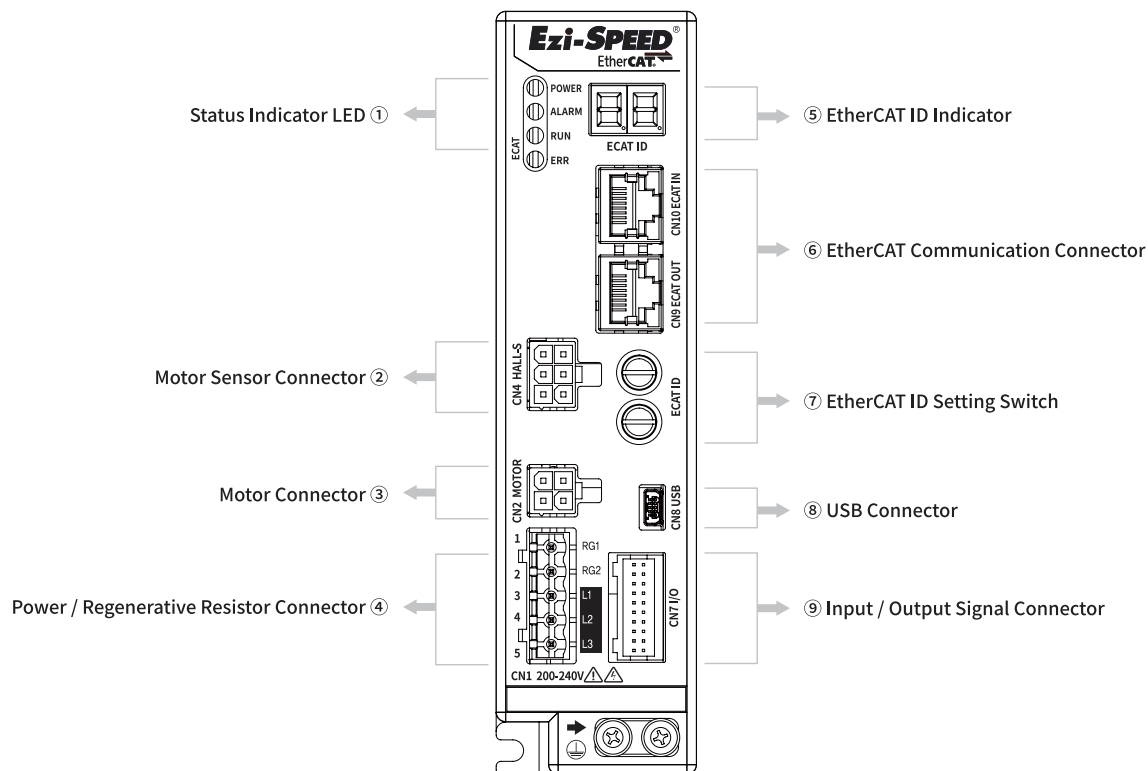
Dimensions of Motor with Hollow Shaft Gearbox [mm]

400_w

Unit Part Number	Gearbox Part Number	□ Gear Ratio	Mounting Bolt
Ezi-SPEED-EC-104-H-400-C-R□-H	ESG-104-H-R□-H	5, 10, 15, 20, 30, 50, 100	M8×90



Settings and Operation



1. Name and Function of Parts

No.	Name	Function
①	Status Indicator LED	Indicates the status of the drive.
②	Motor Sensor Connector (CN4 HALL-S)	Connects the motor sensor.
③	Motor Connector (CN2 MOTOR)	Connects the motor power.
④	Power / Regenerative Resistor Connector (CN1)	Connects the main power supply and the regenerative resistor.
⑤	EtherCAT ID Indicator (ECAT ID)	Displays the node address when operating normally. Displays the error code when an alarm occurs.
⑥	EtherCAT Communication Connector (CN10 ECAT IN)	Connects to the upper EtherCAT communication-compatible device.
	EtherCAT Communication Connector (CN9 ECAT OUT)	Connects to the next node in sequence among EtherCAT communication-supported devices.
⑦	EtherCAT ID Setting switch (ECAT ID)	Sets the node address.
⑧	USB Connector (CN8 USB)	Connects the drive to a PC.
⑨	Input / Output Signal Connector (CN7 I/O)	Connects input / output signals.

2. Status Indicator LED

(1) Drive Status Indicator LED

Item	Color	Function	Description
POWER	Green	Power Status	Lights up when power is applied.
ALARM	Red	Alarm Status	Flashes when an error occurs.

List of Error Types by the Number of LED Blinking

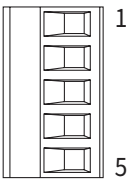
No.	Error Type	Causes
1	Overcurrent	Excessive current has flown through the drive.
2	Overspeed	The rotation speed of the motor output shaft exceeds approx. 120 % of maximum speed.
5	Overtemperature	When the internal temperature of the drive exceeds the allowable temperature.
6	Overvoltage	When the back electromotive force of the motor increases and the motor driving voltage inside the drive exceeds the allowable rated voltage.
8	Hall sensor Error	There is a problem with the connection between the drive and the motor sensor.
9	Undervoltage	When the input power voltage is lower than allowable minimum voltage.
10	Initial Operation Inhibition	Power is applied while the FWD or REV input is on. The error will operate only if the 'No Operation at Initial Run' parameter is set to 1.
11	System error	There is a problem in the internal circuit board.
12	ROM error	The stored data is damaged or the read / write of the EEPROM is failed.
15	External stop error	When EXT-ERROR input is executed in direct IO (operates when EXT-ERROR input is set in direct IO).
Lights up	49	Drive Alarm Occurrence
	50	When other alarms occur in the drive.
	52	Drive Internal Communication Error
	53	When a timeout error occurs in the internal communication.
	71	Network Initialization Error
	76	When a CRC error occurs in the internal communication.
	100	When a command is not executed properly in the internal communication.
	101	When an error occurs during the initialization process of communication hardware due to incorrect values written in the EEPROM.
	102	When internal communication of the drive cannot be started
	110	When parameters are not properly saved in ROM
	121	When the checksum of the ROM does not match
	122	When an error occurs during the process of reading data from FRAM
	123	When an error occurs during the process of reading data from ROM
	124	When an error occurs during the process of writing data to ROM (1)
	200	When an error occurs during the process of writing data to ROM (2)
	500	When an error occurs during the process of writing data to ROM (3)
		When an error occurs during the process of writing data to ROM (4)
		When the parameter values stored in ROM exceed the allowable range
		When a communication error occurs during EtherCAT communication

(2) EtherCAT Indicator LED

Item	Color	Status	Description
RUN	Green	OFF	When in an initialization mode or when the power is OFF.
		Blinking	Pre-Operational mode
		Single Flash	Safe-Operational mode
		ON	Operational mode
		Flickering	Bootstrap mode
ERR	Red	OFF	When no communication error has occurred or when the power is OFF.
		Blinking	Communication setting error
		Single Flash	Communication data error
		Double Flash	Watchdog Timeout
Link / Activity	Green	OFF	When communication is not connected.
		ON	When communication is connected but not yet operational.
		Flickering	When communication is connected and operational.

3. Power / Regenerative Resistor Connector (CN1)

No.	Function
1	Regenerative Resistor Connection (RG1)
2	Regenerative Resistor Connection (RG2)
3	Power Input (L1)
4	Power Input (L2)
5	Power Input (L3)

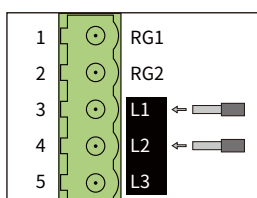


* Use RG1, RG2 terminals when connecting a regenerative resistor. A regenerative resistor can be used when the deceleration time is short or the load with large inertia is applied.

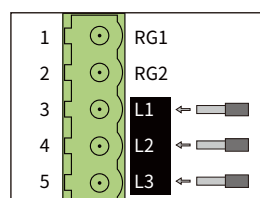
* Please refer to the manual for details of regenerative resistor specifications.

Connection Method

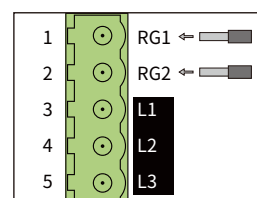
Single-Phase: 200 - 240 V



Three-Phase: 200 - 240 V



Regenerative Resistor

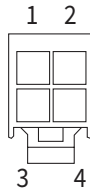


Wire Specifications

AWG18 ~ 14 (0.75 ~ 2.0 mm²)

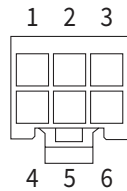
4. Motor Connector (CN2)

No.	Function	I/O
1	-	-
2	BLDC_U	Output Power
3	BLDC_W	Output Power
4	BLDC_V	Output Power



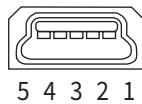
5. Motor sensor Connector (CN4)

No.	Function	I/O
1	DC 5 V	Output Power
2	GND	Common
3	GND	Common
4	HALL_U	Input
5	HALL_V	Input
6	HALL_W	Input



6. USB Connector (CN8)

No.	Function
1	VBUS
2	D-
3	D+
4	-
5	GND

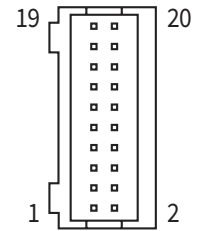


Specification

Standard USB cable (USB 2.0 Mini Type B)

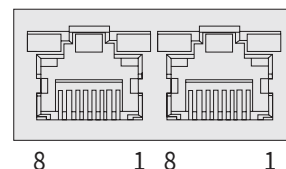
7. Input / Output Signal Connector (CN7)

No.	Function	I/O
1	HCOM	Input
2	IN0	Input
3	IN1	Input
4	IN2	Input
5	IN3	Input
6	IN4	Input
7	IN5	Input
8	IN6	Input
9	LCOM	Common
10	OUT0+	Output
11	OUT0-	Output
12	OUT1+	Output
13	OUT1-	Output
14	VH	Input
15	VM	Input
16	VL	Input
17	-	-
18	-	-
19	-	-
20	-	-

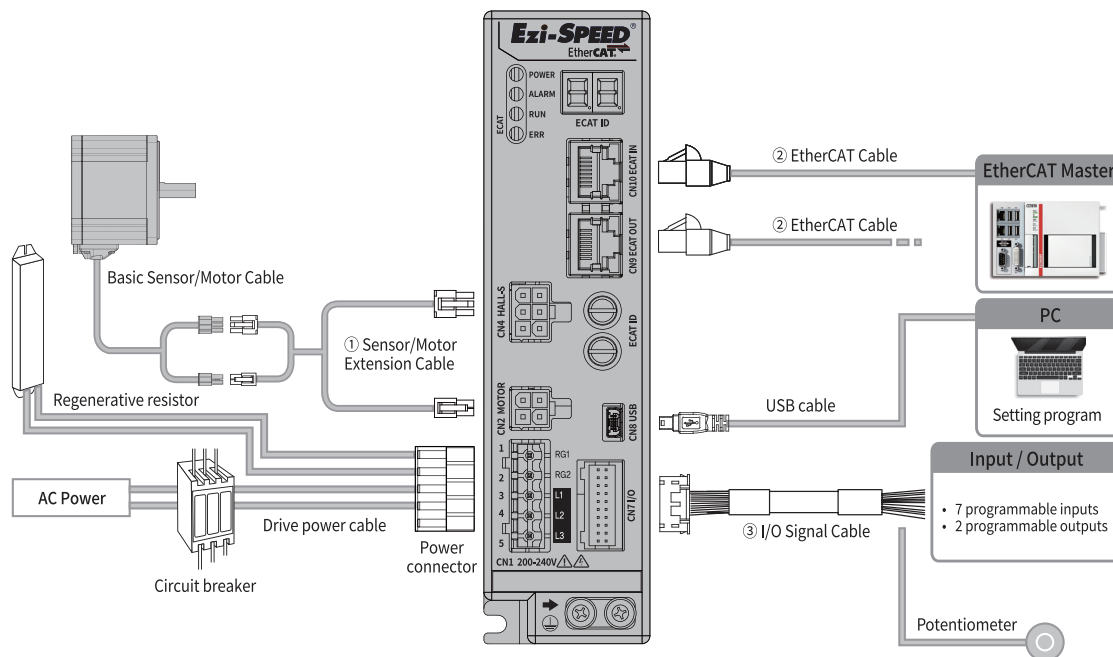


8. EtherCAT Communication Connector (CN9, CN10)

No.	Function	Description
1	TD+	Transmission Data+
2	TD-	Transmission Data-
3	RD+	Reception Data+
4	N.C.	Not connected
5	N.C.	Not connected
6	RD-	Reception Data-
7	N.C.	Not connected
8	N.C.	Not connected
Frame	FG	Frame Ground



System Configuration [30, 60, 120 W]



Cable Type	Max. Length	Remarks
① Sensor / Motor Extension Cable	10 m	Options (Sold separately)
② EtherCAT Comm. Cable	100 m	
③ I/O Signal Cable	20 m	
Sensor / Motor Cable	0.3 m	Basic cables are attached to motors.
Drive Power Cable	3 m	This cable is not provided by FASTECH.
USB Cable	5 m	* USB cables are not provided by FASTECH. We recommend using a standard USB cable (USB 2.0 Mini Type B).

1. Accessories

Connectors

These are connector specifications for drive cabling.

Purpose		Item	Part Number	Manufacturer
Power (CN1)		Terminal Block	CPF5.08-05P	STELVIO
Motor (CN2)	Drive Side (CN2)	Housing	5557-04R	MOLEX
		Terminal	5556T	
	Motor Side	Housing	5559-04P	MOLEX
		Terminal	5558T	
Sensor (CN4)	Drive Side (CN4)	Housing	5557-06R	MOLEX
		Terminal	5556T	
	Sensor Side	Housing	5559-06P	MOLEX
		Terminal	5558T	
Signal (CN7)		Housing	PADP-20V-1S	JST
		Terminal	SPH-002T-P0.5L	

2. Options

Sensor / Motor Extension Cable

These are the cables to connect the drive for 30 W, 60 W and 120 W to a sensor and a motor.

Purpose	Part Number	Length [m]	Cable Type	Remarks
1	CSPD-A-001F	1	Normal Cable	Max. Length: 10 m
2	CSPD-A-002F	2		
3	CSPD-A-003F	3		
5	CSPD-A-005F	5		
7	CSPD-A-007F	7		
10	CSPD-A-010F	10		

EtherCAT Communication Cable

Purpose	Part Number	Length [m]	Cable Type	Remarks
Connects EtherCAT Communication	CGNR-EC-001F	1	Fixed Cable	• STP (Shielded Twisted Pair) cable • Category 5e or higher • Maximum usable length: 100 m
	CGNR-EC-002F	2		
	CGNR-EC-003F	3		
	CGNR-EC-005F	5		

※ If you need cables with length(in units of 1 m) not listed on the table, please contact FASTECH for more information.

I/O Signal Cable

These are the cables to connect the drive and other input / output devices.

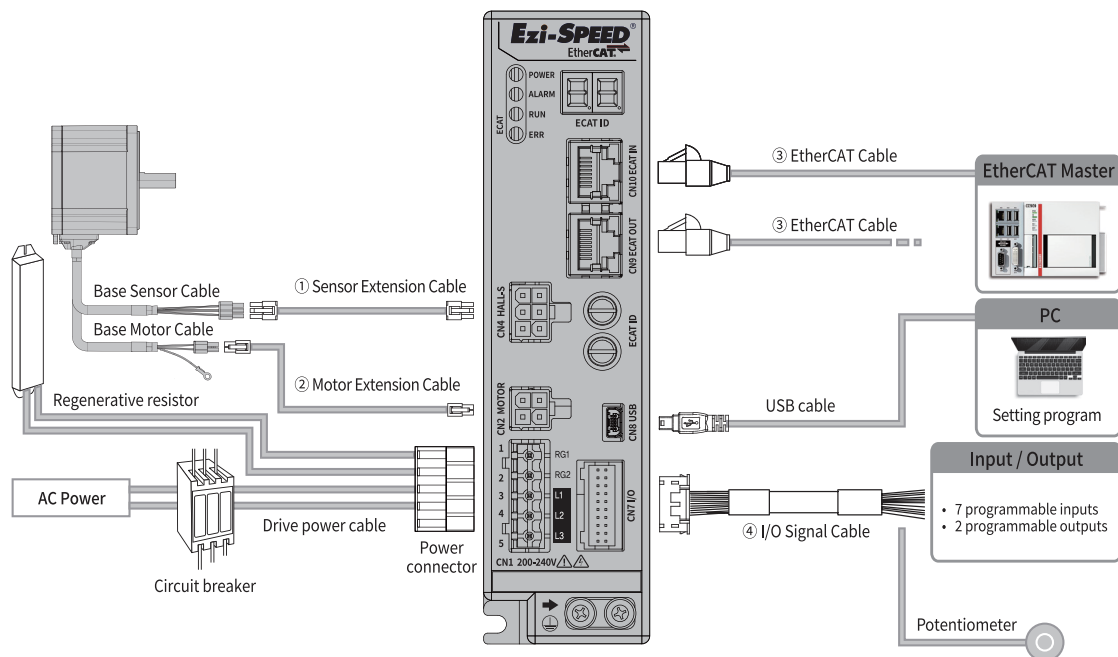
Purpose	Part Number	Length [m]	Cable Type	Remarks
Drive - I/O Device Connection	CSPD-IO-0R6F	0.6	Normal Cable	Max. Length: 20 m
	CSPD-IO-001F	1		
	CSPD-IO-002F	2		
	CSPD-IO-003F	3		
	CSPD-IO-005F	5		
	CSPD-IO-007F	7		
	CSPD-IO-010F	10		
	CSPD-IO-015F	15		
	CSPD-IO-020F	20		

Regenerative Resistor

It is used to prevent overvoltage alarms when driving a load with a short deceleration time or a large inertia.

Purpose	Part Number	Specifications		Product Image
Regenerative Resistor	BRM-A100W-400J	Resistance	400 Ω	
		Capacity	100 W	
		Cable Length	30 cm	

System Configuration [200, 400 W]



Cable Type	Max. Length	Remarks
① Sensor Extension Cable	10 m	Options
② Motor Extension Cable	10 m	
③ EtherCAT Comm. Cable	100 m	
④ I/O Signal Cable	20 m	
Sensor Cable	0.3 m	Basic cables are attached to motors.
Motor Cable	0.3 m	
Drive Power Cable	3 m	This cable is not provided by FASTECH.
USB Cable	5 m	* USB cables are not provided by FASTECH. We recommend using a standard USB cable (USB 2.0 Mini Type B).

1. Accessories

Connectors

These are connector specifications for drive cabling.

Purpose		Item	Part Number	Manufacturer
Power (CN1)		Terminal Block	CPF5.08-05P	STELVIO
Motor (CN2)	Drive Side (CN2)	Housing	5557-04R	MOLEX
		Terminal	5556T	
	Motor Side	Housing	5559-04P	MOLEX
		Terminal	5558T	
Sensor (CN4)	Drive Side (CN4)	Housing	5557-06R	MOLEX
		Terminal	5556T	
	Sensor Side	Housing	5559-06P	MOLEX
		Terminal	5558T	
Signal (CN7)		Housing	PADP-20V-1S	JST
		Terminal	SPH-002T-P0.5L	

2. Options

Sensor Extension Cable

These are the cables to connect the drive for 200 W and 400 W to a sensor.

Purpose	Part Number	Length [m]	Cable Type	Remarks
Drive - Basic Sensor Cable Connection	CSPD-S-001F	1	Normal Cable	Max. Length: 10 m
	CSPD-S-002F	2		
	CSPD-S-003F	3		
	CSPD-S-005F	5		
	CSPD-S-007F	7		
	CSPD-S-010F	10		

Motor Extension Cable

These are the cables to connect the drive for 200 W and 400 W to a motor.

Purpose	Part Number	Length [m]	Cable Type	Remarks
Drive - Basic Motor Cable Connection	CSPD-M-001F	1	Normal Cable	Max. Length: 10 m
	CSPD-M-002F	2		
	CSPD-M-003F	3		
	CSPD-M-005F	5		
	CSPD-M-007F	7		
	CSPD-M-010F	10		

EtherCAT Communication Cable

Purpose	Part Number	Length [m]	Cable Type	Remarks
Connects EtherCAT Communication	CGNR-EC-001F	1	Fixed Cable	• STP (Shielded Twisted Pair) cable • Category 5e or higher • Maximum usable length: 100 m
	CGNR-EC-002F	2		
	CGNR-EC-003F	3		
	CGNR-EC-005F	5		

※ If you need cables with length(in units of 1 m) not listed on the table, please contact FASTECH for more information.

I/O Signal Cable

These are the cables to connect the drive and other input/output devices.

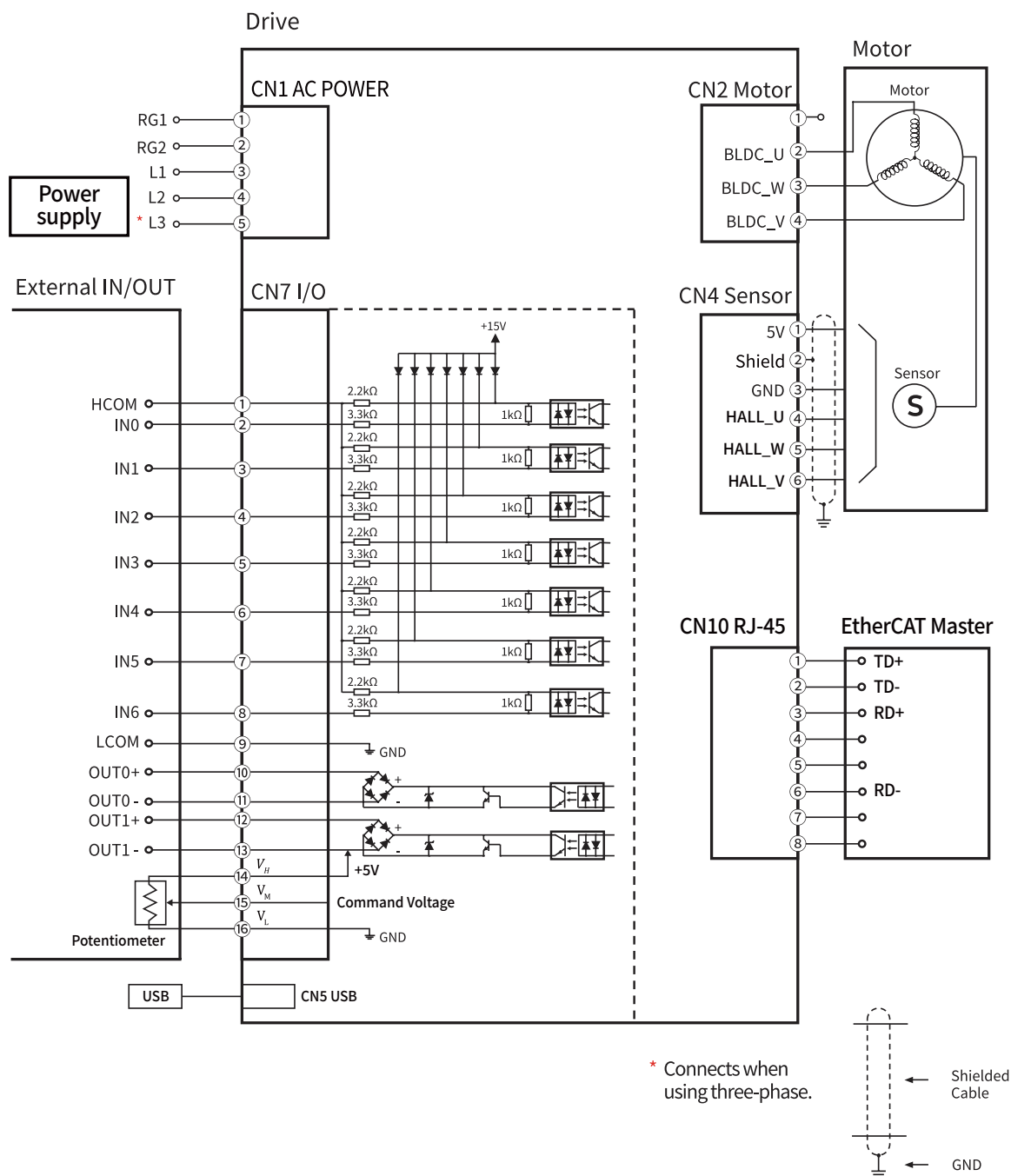
Purpose	Part Number	Length [m]	Cable Type	Remarks
Drive - I/O Device Connection	CSPD-IO-0R6F	0.6	Normal Cable	Max. Length: 20 m
	CSPD-IO-001F	1		
	CSPD-IO-002F	2		
	CSPD-IO-003F	3		
	CSPD-IO-005F	5		
	CSPD-IO-007F	7		
	CSPD-IO-010F	10		
	CSPD-IO-015F	15		
	CSPD-IO-020F	20		

Regenerative Resistor

It is used to prevent overvoltage alarms when driving a load with a short deceleration time or a large inertia.

Purpose	Part Number	Specifications		Product Image
Regenerative Resistor	BRM-A100W-400J	Resistance	400 Ω	
		Capacity	100 W	
		Cable Length	30 cm	

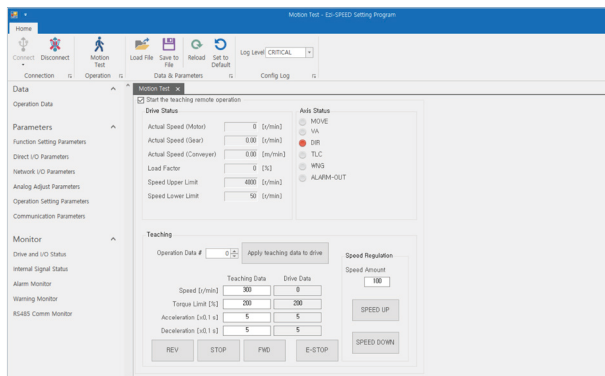
External Wiring Diagram



In order to use the products listed in this catalog safely and correctly,
be sure to read the instruction manual before using the product.

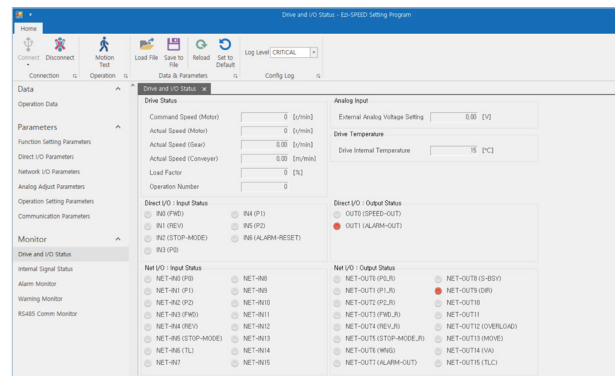
When connecting I/O cable between controller and drive, please turn off the power of both controller and drive to prevent electric shock or to protect the drive from any damage.

Ezi-SPEED Setting Program



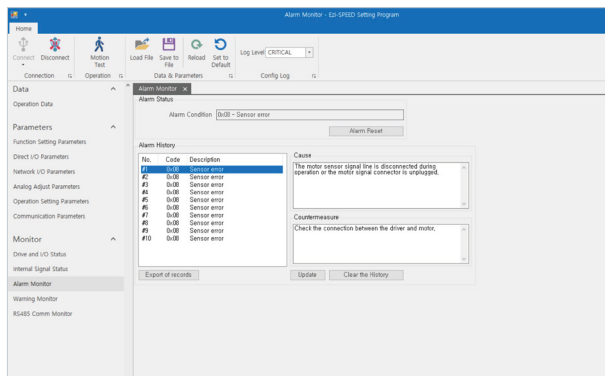
Motion Test

The operation of the drive can be easily tested.



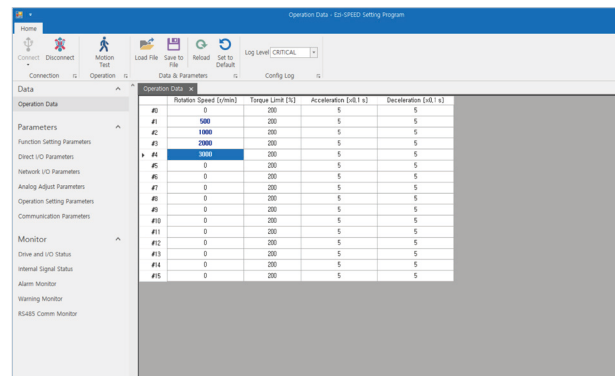
Drive and I/O Status

The drive status, input/output status, and NET command & NET status can be checked.



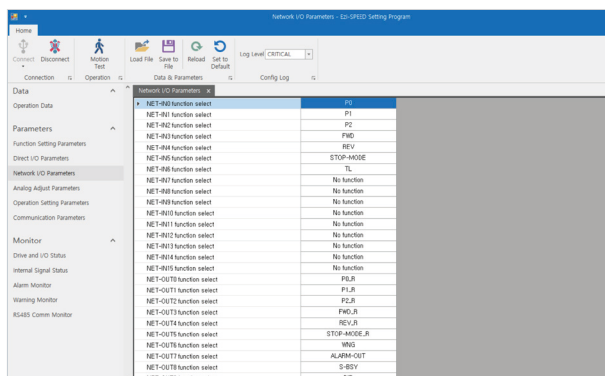
Alarm Monitor

Alarm, warning, and communication errors can be monitored.



Operation Data

Up to 16 motor operation data can be set, and the changes are automatically saved to the drive.



Parameters

Various parameters can be configured, and the changes are automatically saved to the drive.

Ezi-SPEED Setting program can be downloaded from the website (www.fastech-motions.com).

Ezi-SPEED Setting program supports Windows 7/8/10.

Ezi-SPEED Setting program may change without notice for performance improvement.

MEMO



Fast Accurate Smooth Motion

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