

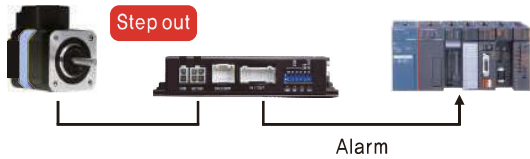


- ✓ **Completely free from the Concern of Loss of Position**
(Alarm Feneration when Step-Out)
- ✓ **Perfect Positioning and Completion**
(Positioning Completion Signal Generation)
- ✓ **Don' t Care what the Phase of Motor is**
(Position Accuracy only Related to Endocer Resolution)
- ✓ **Reduce the Motor Temperature and Energy Usage**
(Current Control According to load)
- ✓ **Torque Improvement by Run Current Control**
(Max. 150% Current Control)



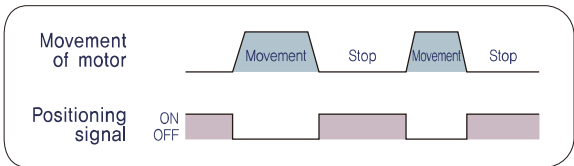
1. No Step Out

(Alarm will be generated when step out)
 Because of mounted encoder constantly monitor the current position, step out cannot be occurred. If step out occurred by external force of overloads, alarm signal will be sent to upper controller. Thus, upper controller can recognize step out of step motor.



2. Perfect Positioning Completion Check

(Positioning completion signal will be generated)
 When motor stops at the goal position, encoder detect it and send positioning completion signal to upper controller. Therefore Hi STEP resolve the problem of unclear positioning of current Open Loop System.

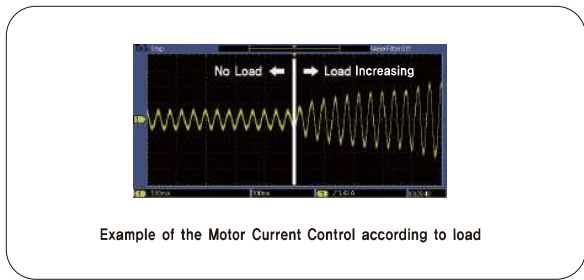
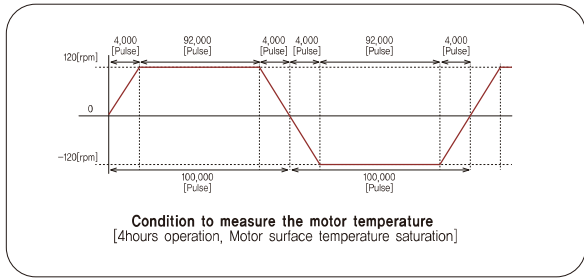
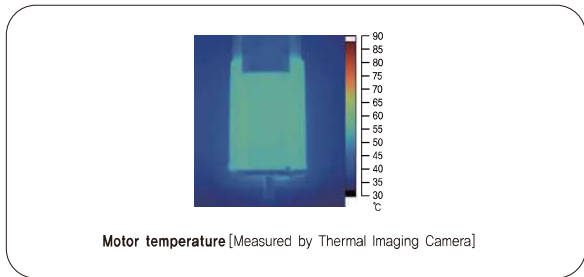


3. High Position Accuracy

Hi STEP controls position by using high precision of encoder. Regardless of motor type (2 Phase or 5 Phase), Hi STEP position precision is only related to mounted encoder resolution so high precision of positioning is possible unlike open loop micro step motor and driver which adapts 2 Phase or 5 Phase

4. Heat Reduction / Energy Saving

(Motor Current Control according to load)
 Hi STEP automatically controls motor current according to load. Hi STEP reduces motor current when motor load is low, and increases motor current when load is high. By optimizing the motor current, motor heat can be minimized and energy can be saved.

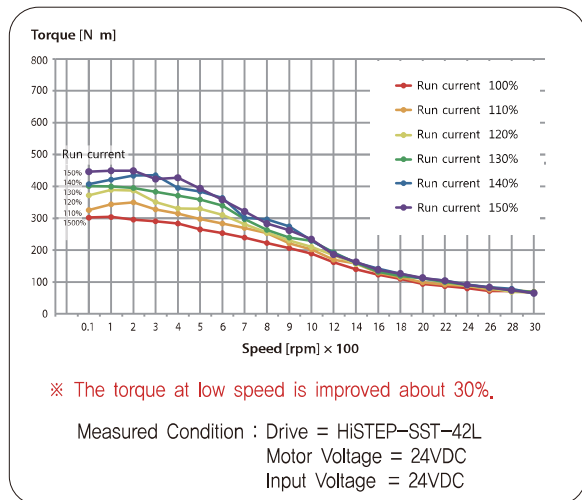


5. Torque Improvement

(Motor Current Setting)

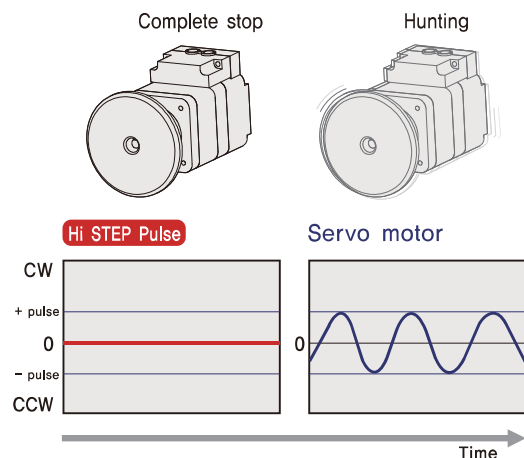
Hi STEP can increase the motor current up to 150% by setting the Run Current by parameter. Therefore, acceleration and deceleration characteristics and torque characteristics at low speed can be increased.

Hi STEP can improve the torque in the low speed range by about 30%.



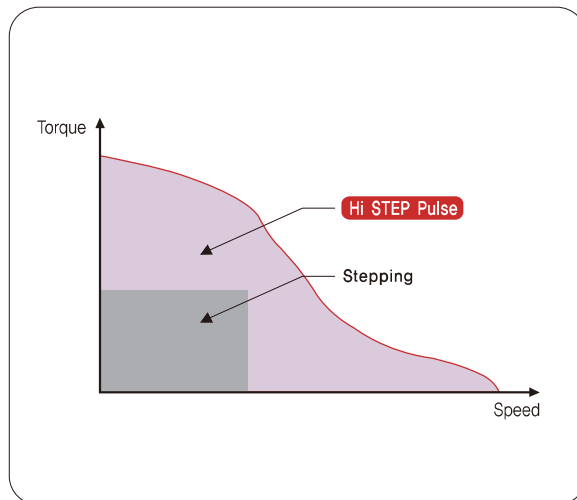
6. No Hunting

Traditional servo motor drives overshoot their position and try to correct by overshooting the opposite direction, especially in high gain applications. This is called null hunt and is especially prevalent in systems that the break away or static friction is significantly higher than the running friction. The cure is lowering the gain, which affects accuracy or using Hi STEP Motion Control System. Hi STEP utilizes the unique characteristics of stepping motors and locks itself into the desired target position, eliminating Null Hunt. This feature is especially useful in applications such as nanotech manufacturing, semiconductor fabrication, vision systems and ink jet printing in which system oscillation and vibration could be a problem.



7. High Torque

Compared with common step motors and drives, Hi STEP motion control systems can maintain a high torque state over relatively long period of time. This means that Hi STEP continuously operates without loss of position under 100% of the load. Unlike conventional Microstep drives, Hi STEP exploits continuous high torque operation during high speed motion due to its innovative optimum current phase control.



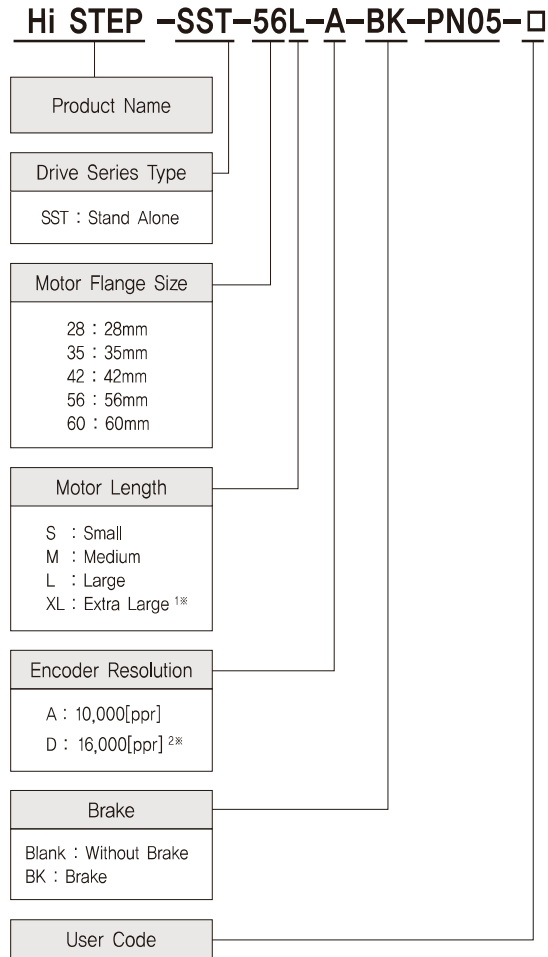
8. Variety of Protection Functions

Drive and equipment can be protected by the alarm (11 kinds) of such as motor connection error, encoder connection error etc.

9. Variety of Position Command Unit

According to the purpose of usage, Hi STEP offer 16 stage (500~50,000P/R) of position command unit.

Hi STEP Pulse Part Numbering



1※ : Motor length XL only 42mm size

2※ : Encoder Resolution 16,000[ppr] only respond 28mm size

Standard Combination

Hi STEP Pulse series

Unit Part Number	Motor Model Number	Drive Model Number
HiSTEP-SST-28S-D	Hi-SM-28S-D	Hi-SD-P-28S-D
HiSTEP-SST-28M-D	Hi-SM-28M-D	Hi-SD-P-28M-D
HiSTEP-SST-28L-D	Hi-SM-28L-D	Hi-SD-P-28L-D
HiSTEP-SST-35M-A	Hi-SM-35M-A	Hi-SD-P-35M-A
HiSTEP-SST-35L-A	Hi-SM-35L-A	Hi-SD-P-35L-A
HiSTEP-SST-42S-A	Hi-SM-42S-A	Hi-SD-P-42S-A
HiSTEP-SST-42M-A	Hi-SM-42M-A	Hi-SD-P-42M-A
HiSTEP-SST-42XL-A	Hi-SM-42XL-A	Hi-SD-P-42XL-A
HiSTEP-SST-56S-A	Hi-SM-56S-A	Hi-SD-P-56S-A
HiSTEP-SST-56M-A	Hi-SM-56M-A	Hi-SD-P-56M-A
HiSTEP-SST-56L-A	Hi-SM-56L-A	Hi-SD-P-56L-A
HiSTEP-SST-60S-A	Hi-SM-60S-A	Hi-SD-P-60S-A
HiSTEP-SST-60M-A	Hi-SM-60M-A	Hi-SD-P-60M-A
HiSTEP-SST-60L-A	Hi-SM-60L-A	Hi-SD-P-60L-A

Combination with Brake

Hi STEP Pulse series

Unit Part Number	Motor Model Number	Drive Model Number
HiSTEP-SST-42S-A-BK	Hi-SM-42S-A-BK	Hi-SD-P-42S-A
HiSTEP-SST-42M-A-BK	Hi-SM-42M-A-BK	Hi-SD-P-42M-A
HiSTEP-SST-42XL-A-BK	Hi-SM-42XL-A-BK	Hi-SD-P-42XL-A
HiSTEP-SST-56S-A-BK	Hi-SM-56S-A-BK	Hi-SD-P-56S-A
HiSTEP-SST-56M-A-BK	Hi-SM-56M-A-BK	Hi-SD-P-56M-A
HiSTEP-SST-56L-A-BK	Hi-SM-56L-A-BK	Hi-SD-P-56L-A
HiSTEP-SST-60S-A-BK	Hi-SM-60S-A-BK	Hi-SD-P-60S-A
HiSTEP-SST-60M-A-BK	Hi-SM-60M-A-BK	Hi-SD-P-60M-A
HiSTEP-SST-60L-A-BK	Hi-SM-60L-A-BK	Hi-SD-P-60L-A

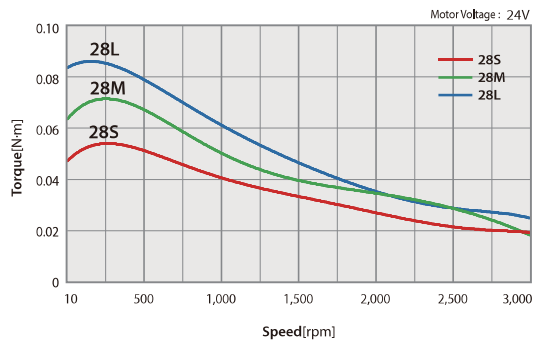
Specifications of Motor

MODEL		UNIT	Hi-SM-28 series			Hi-SM-35 series		
			28S	28M	28L	35M	35L	
DRIVE METHOD		—	BI-POLAR					
NUMBER OF PHASES		—	2	2	2	2	2	
VOLTAGE		VDC	3,75	4,55	6,2	3,8	2,7	
CURRENT per PHASE		A	0,67	0,67	0,67	0,8	1,0	
RESISTANCE per PHASE		Ohm	5,6	6,8	9,2	4,8	2,7	
INDUCTANCE per PHASE		mH	4,2	4,9	5,7	4,0	4,3	
HOLDING TORQUE		N·m	0,069	0,098	0,118	0,078	0,137	
ROTOR INERTIA		g·cm ²	9,0	13	18	10	14	
WEIGHTS		g	110	140	200	120	180	
LENGTH(L)		mm	32	45	50	26	36	
PERMISSIBLE OVERHUNG LOAD (DISTANCE FROM END OF SHAFT)	3mm	N	30	30	30	22	22	
	8mm		38	38	38	26	26	
	13mm		53	53	53	33	33	
	18mm		—	—	—	46	46	
PERMISSIBLE THRUST LOAD		N	Lower than motor weight					
INSULATION RESISTANCE		Mohm	100 MIN.(at 500VDC)					
INSULATION CLASS		—	CLASS B(130°C)					
OPERATING TEMPERATURE		°C	0 to 55					

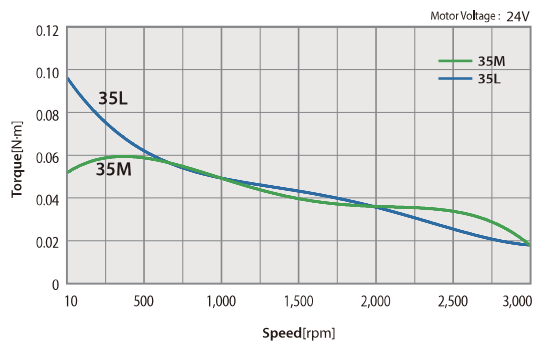
MODEL		UNIT	Hi-SM-42 series				Hi-SM-56 series			Hi-SM-60 series		
			42S	42M	42L	42XL	56S	56M	56L	60S	60M	60L
DRIVE METHOD		—	BI-POLAR									
NUMBER OF PHASES		—	2	2	2	2	2	2	2	2	2	2
VOLTAGE		VDC	2,8	2,8	2,8	7,2	1,96	2,52	3,16	1,32	1,48	2,2
CURRENT per PHASE		A	1,3	1,68	1,68	1,2	2,8	2,8	2,8	4,0	4,0	4,0
RESISTANCE per PHASE		Ohm	2,1	1,65	1,65	6,0	0,7	0,9	1,13	0,33	0,37	0,55
INDUCTANCE per PHASE		mH	2,5	3,2	2,8	15,6	1,4	2,5	3,6	0,75	1,1	2,7
HOLDING TORQUE		N·m	0,216	0,353	0,431	0,650	0,539	1,00	1,72	0,88	1,28	2,40
ROTOR INERTIA		g·cm ²	35	54	68	114	120	300	480	240	490	690
WEIGHTS		g	220	280	350	500	470	700	1000	600	1000	1300
LENGTH(L)		mm	33	39	47	60	41	56	76	47	56	85
PERMISSIBLE OVERHUNG LOAD (DISTANCE FROM END OF SHAFT)	3mm	N	22	22	22	22	52	52	52	70	70	70
	8mm		26	26	26	26	65	65	65	87	87	87
	13mm		33	33	33	33	85	85	85	114	114	114
	18mm		46	46	46	46	123	123	123	165	165	165
PERMISSIBLE THRUST LOAD		N	Lower than motor weight									
INSULATION RESISTANCE		Mohm	100 MIN.(at 500VDC)									
INSULATION CLASS		—	CLASS B(130°C)									
OPERATING TEMPERATURE		°C	0 to 55									

Torque Characteristics of Motor

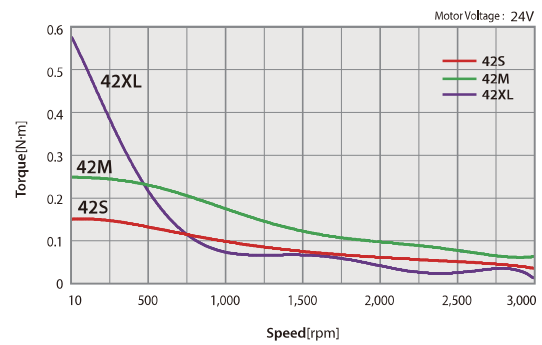
HiSTEP-SST-28series



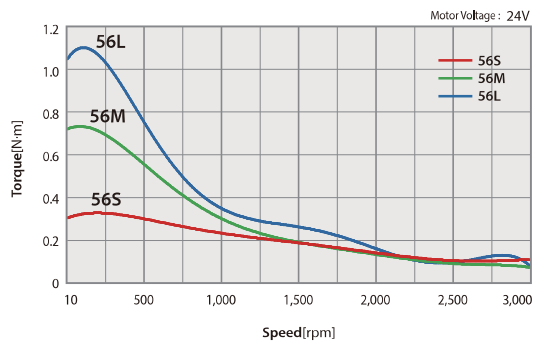
HiSTEP-SST-35series



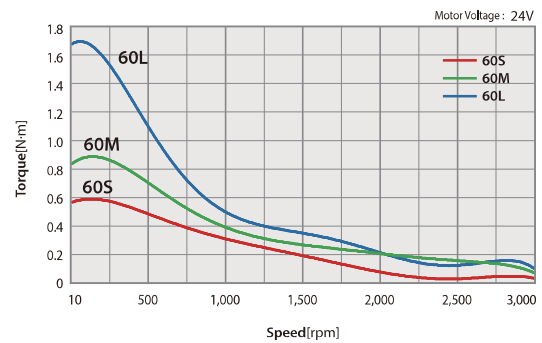
HiSTEP-SST-42series



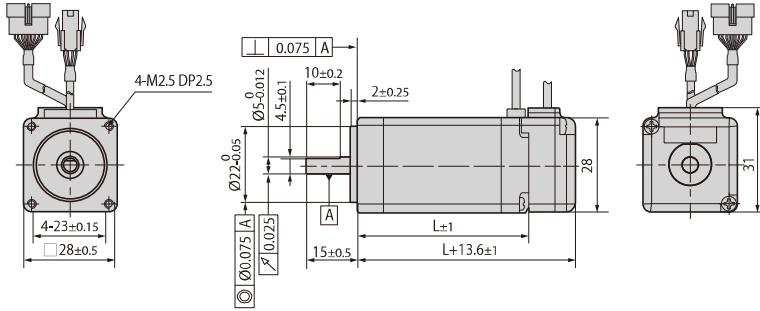
HiSTEP-SST-56series



HiSTEP-SST-60series

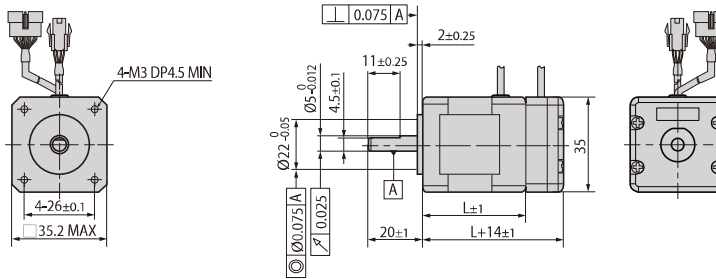


Dimensions of Motor [mm]



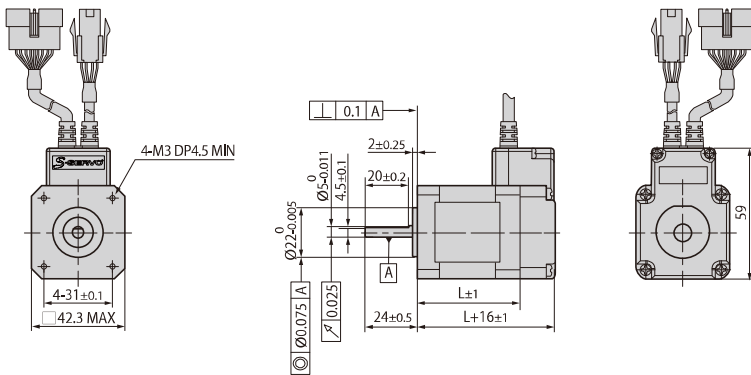
28mm

Model name	Length(L)
Hi-SM-28S	32
Hi-SM-28M	45
Hi-SM-28L	50



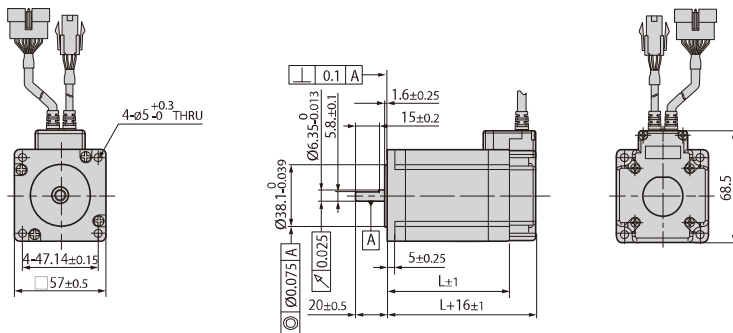
35mm

Model name	Length(L)
Hi-SM-35M	26
Hi-SM-35L	36



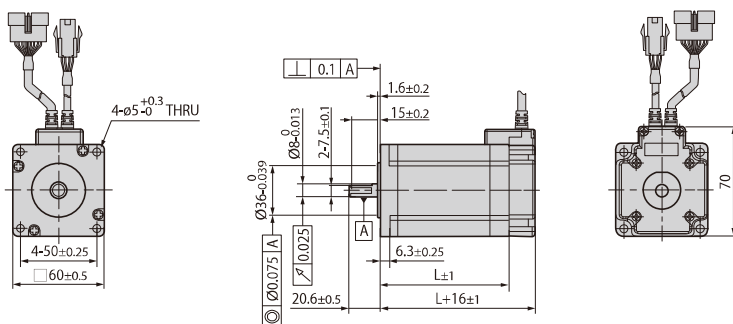
42mm

Model name	Length(L)
Hi-SM-42S	33
Hi-SM-42M	39
Hi-SM-42XL	60



56mm

Model name	Length(L)
Hi-SM-56S	41
Hi-SM-56M	56
Hi-SM-56L	76



60mm

Model name	Length(L)
Hi-SM-60S	47
Hi-SM-60M	56
Hi-SM-60L	85

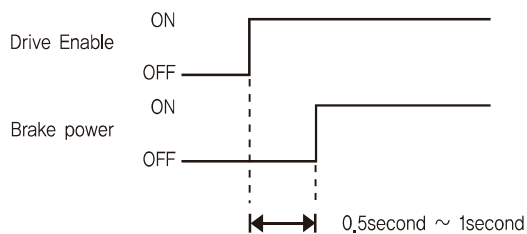
Specifications of Motor with Brake

Unit Part Number	Motor Model Number	Electronic Brake					Motor Unit Weight [g]	Permitted Overhung Load [N]				Permitted Thrust Load [N]
		Type	Voltage Input [V]	Rated Current [A]	Power Consumption [W]	Statical Friction Torque [N·m]		Length from Motor Point [mm]				
								3	8	13	18	
HISTEP-SST-42S-■-BK	Hi-SM-42S-■-BK	Non-excitation run Type	24VDC ±10%	0,2	5	0,2	510	22	26	33	46	Must be Lower than Unit's Weight
HISTEP-SST-42M-■-BK	Hi-SM-42M-■-BK						570					
HISTEP-SST-42XL-■-BK	Hi-SM-42XL-■-BK						770					
HISTEP-SST-56S-■-BK	Hi-SM-56S-■-BK			0,27	6,6	0,7	870	52	65	85	123	
HISTEP-SST-56M-■-BK	Hi-SM-56M-■-BK						1190					
HISTEP-SST-56L-■-BK	Hi-SM-56L-■-BK						1380					
HISTEP-SST-60S-■-BK	Hi-SM-60S-■-BK			0,27	6,6	0,7	1150	70	87	114	165	
HISTEP-SST-60M-■-BK	Hi-SM-60M-■-BK						1350					
HISTEP-SST-60L-■-BK	Hi-SM-60L-■-BK						1960					

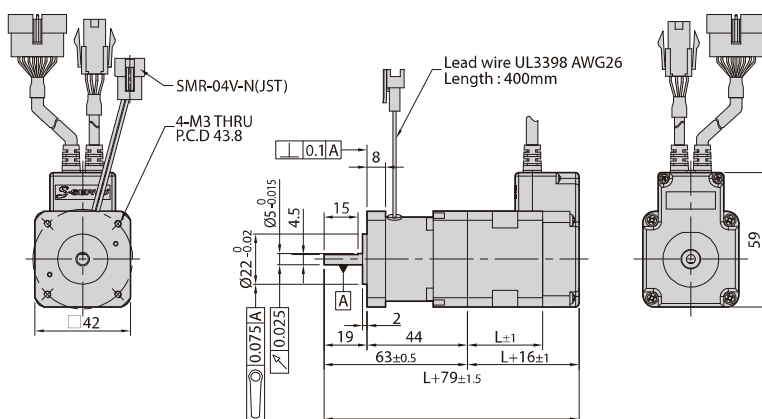
- * The code of encoder resolution will be marked in "■"
- * Electronic Brake cannot be used for braking, Position hold purpose only when power OFF.
- * The weight means Motor Unit Weight including Motor and Electronic Brake.
- * Motor Model Number is combined model name of Motor and Brake.
- * Motor specification and torque characteristic are same as Standard Motor.

* Brake Operation Timing Chart

Hi STEP SST control Brake by Drive automatically.
 Please refer to below Timing Chart when control Brake from upper controller other than using Hi STEP SST Brake control.
 Otherwise, Drive malfunctioning and loads can be fall down.
 Also, please do not operate Brake while motor operation to prevent damage.

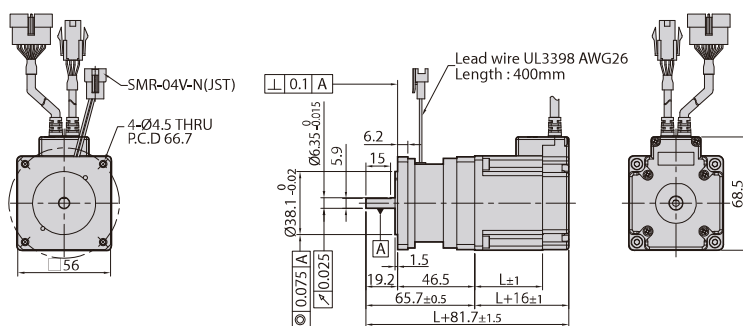


Dimensions of Motor with Brake [mm]



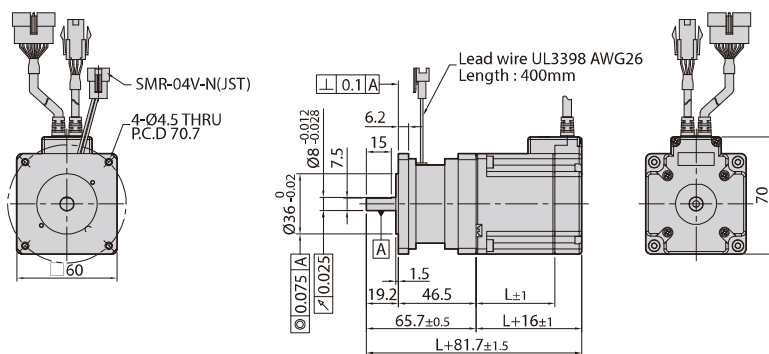
42mm

Model Name	Length(L)	Weight(kg)
Hi-SM-42S	33	0,51
Hi-SM-42M	39	0,57
Hi-SM-42XL	60	0,77



56mm

Model Name	Length(L)	Weight(kg)
Hi-SM-56S	41	0,87
Hi-SM-56M	56	1,19
Hi-SM-56L	76	1,38



60mm

Model Name	Length(L)	Weight(kg)
Hi-SM-60S	47	1,15
Hi-SM-60M	56	1,35
Hi-SM-60L	85	1,96

Specifications of Drive [HiSTEP Pulse]

Motor Model	Hi-SM-28 series	Hi-SM-35 series	Hi-SM-42 series	Hi-SM-56 series	Hi-SM-60 series
Driver Model	Hi-SD-P-28 series	Hi-SD-P-35 series	Hi-SD-P-42 series	Hi-SD-P-56 series	Hi-SD-P-60 series
Input Voltage	24VDC \pm 10%				
Control Method	Closed loop control with 32bit ARM				
Current Consumption	Max 500mA (Except motor current)				
Operating Condition	Ambient Temperature	<ul style="list-style-type: none"> In Use: 0~50°C In Storage: -20~70°C 			
	Humidity	<ul style="list-style-type: none"> In Use: 35~85% RH (Non-Condensing) In Storage: 10~90% RH (Non-Condensing) 			
	Vib. Resist.	0,5g			
Function ^{*2}	Rotation Speed	0~3,000 [rpm] ^{*1}			
	Resolution [ppr] ^{*4}	500 1,000 1,600 2,000 3,200 3,600 4,000 5,000 6,400 8,000 10,000 20,000 25,000 36,000 40,000 50,000 (Selectable by DIP Switch) * Default: 10,000			
	Maximum Frequency	500kHz (Duty 50%)			
	Protection Functions	Over Current Error, Over Speed Error, Position Tracking Error, Over Load Error, Over Temperature Error, Over Regenerated Voltage Error, Motor Connect Error, Encoder Connect Error, In-Position Error, ROM Error, Position Overflow Error			
	LED Display	Power status, In-Position status, Enable status, Alarm status			
	RUN Current ^{*5}	50%~150% (Selectable by parameter) RUN current is current value which flows onto the motor during operation (rotation) of the motor and it is set based on rated current of the motor. * Default: 100%			
	STOP Current	20%~100% (Selectable by parameter) When motor stop operation, 0,1 second after motor current will be set to STOP current value. STOP current value is a percentage of the rated current of motor. * Default: 50%			
	Pulse Input Method	1 Pulse / 2 Pulse (Selectable by DIP Switch) * Default: 2 Pulse			
	Rotational Direction	CW/CCW (Selectable by DIP Switch) * Default: CW			
	Speed/Position Control Command	Pulse Train Input			
I/O Signal ^{*3}	Input Signals	Position Command Pulse, Enable, Alarm Reset (Photocoupler Input)			
	Output Signals	In-Position, Alarm (Photocoupler Output), Brake			

*1 : Up to the resolution of 10,000[ppr], maximum speed can be reached by 3,000[rpm] and with the resolution more than 10,000[ppr], maximum speed shall be reduced accordingly.

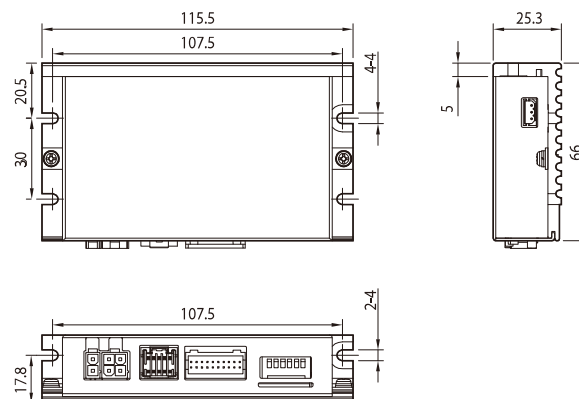
*2 : Please refer to 「Settings and Operating」 to obtain detailed function information.

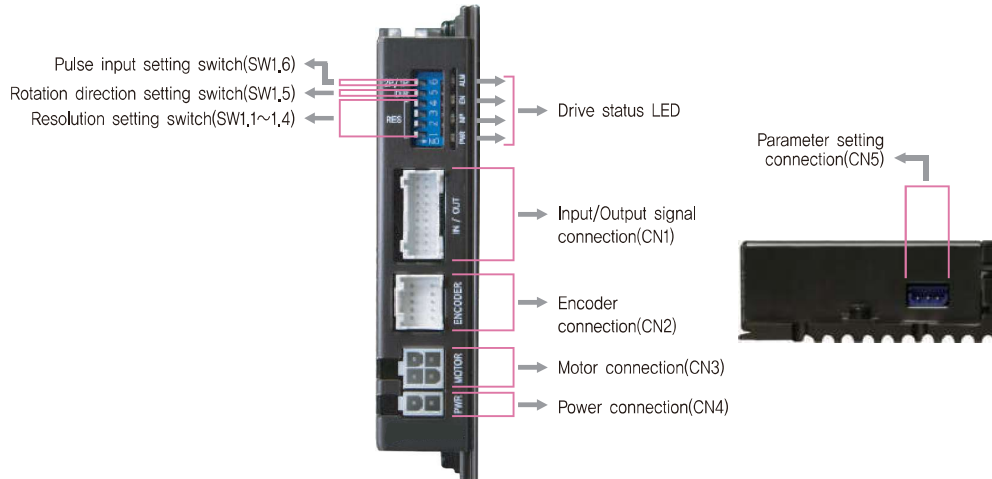
*3 : Please refer to 「Control Input/Output Explanation」 to obtain detailed Input/Output signal information.

*4 : When selected resolution is more than encoder resolution, motor shall be operated by microstep between pulses.

*5 : For more detail information of RUN Current, please refer to the [Parameter Setting GUI].

Dimensions of Drive [mm] [HiSTEP Pulse]





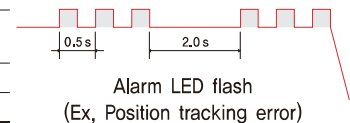
1. Drive Status LED

Indication	Color	Function	ON/OFF Condition
PWR	Green	Power input indication	LED is turned ON when power is applied
INP	Yellow	Complete Positioning Motion	Light on when Position Deviation located within preset value*1 from target position, after Position Command Pulse Input is completed
EN	Orange	Motor Enable Status	Enable: Lights On, Disable: Lights Off
ALM	Red	Alarm indication	Flash when protection function is activated (Identifiable which protection mode is activated by counting the blinking times)

*1 : Default = 0
Can be selected by parameter setting GUI

■ Protection functions and LED flash times

Times	Protection	Conditions
1	Over Current Error	The current through power devices in drive exceeds 4,8A
2	Over Speed Error	Motor speed exceed 3,000 [rpm]
3	Position Tracking Error	Position error value is higher than 90° in motor run state
4	Over Load Error	The motor is continuously operated more than 5 second under a load exceeding the max. torque
5	Over Temperature Error	Inside temperature of drive exceeds 85°C
6	Over Regenerated Voltage Error	Back-EMF more than 48V
7	Motor Connect Error	The power is ON without connection of the motor cable to drive
8	Encoder Connect Error	Cable connection error in Encoder connection of drive
10	In-Position Error	After operation is finished, position error more than 1 pulse is continued for more than 3 seconds
12	ROM Error	Error occurs in parameter storage device(ROM)
15	Position Overflow Error	Position error value is higher than 90° in motor stop state



2. Resolution Setting Switch(SW1.1~SW1.4)

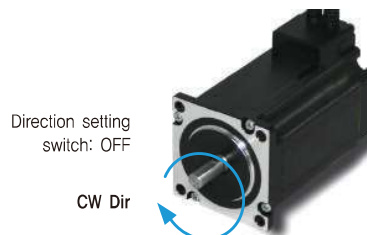
The Number of pulse per revolution.

Position				Pulse/Revolution	Position				Pulse/Revolution
1	2	3	4		1	2	3	4	
ON	ON	ON	ON	500	OFF	ON	ON	ON	6,400
ON	ON	ON	OFF	1,000	OFF	ON	ON	OFF	8,000
ON	ON	OFF	ON	1,600	OFF	ON	OFF	ON	10,000*1
ON	ON	OFF	OFF	2,000	OFF	ON	OFF	OFF	20,000
ON	OFF	ON	ON	3,200	OFF	OFF	ON	ON	25,000
ON	OFF	ON	OFF	3,600	OFF	OFF	ON	OFF	36,000
ON	OFF	OFF	ON	4,000	OFF	OFF	OFF	ON	40,000
ON	OFF	OFF	OFF	5,000	OFF	OFF	OFF	OFF	50,000

*1 : Default = 10,000

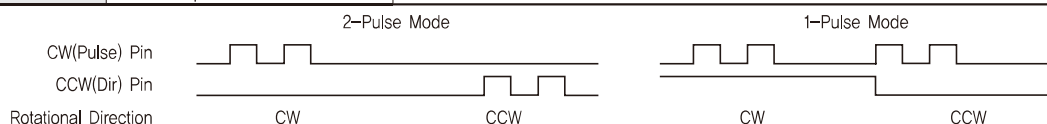
3. Rotational Direction Setting Switch(SW1,5)

Indication	Switch Name	Functions
DIR	Switching Rotational Direction	Based on CW(+Dir signal) input to driver, ON: CCW(-Direction) OFF: CW(+Direction) ※ Default: CW mode



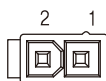
4. Pulse Input Setting Switch(SW1,6)

Indication	Switch Name	Functions
2P/1P	Selecting pulse input mode	Selectable 1-Pulse input mode or 2-Pulse input mode as Pulse input signal. ON: 1-Pulse mode OFF: 2-Pulse mode ※ Default: 2-Pulse mode



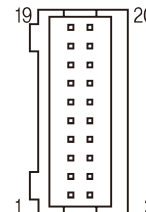
5. Power Connector(CN4)

NO.	Function	I/O
1	24VDC	Input
2	GND	Input



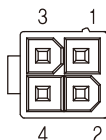
8. Input/Output Signal Connector(CN1)

NO.	Function	I/O
1	A-	Output
2	A+	Output
3	B-	Output
4	B+	Output
5	Z-	Output
6	Z+	Output
7	BRAKE-	Output
8	BRAKE+	Output
9	EXT_GND	Input
10	EXT_24VDC	Input
11	Alarm Reset	Input
12	Enable	Input
13	Alarm	Output
14	In-Position	Output
15	O.C Input	Input
16	S-GND	Output
17	CW-(Pulse-)	Input
18	CW+(Pulse+)	Input
19	CCW-(Dir-)	Input
20	CCW+(Dir+)	Input



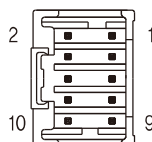
6. Motor Connector(CN3)

NO.	Function	I/O
1	A Phase	Output
2	B Phase	Output
3	/A Phase	Output
4	/B Phase	Output



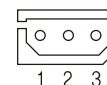
7. Encoder Connector(CN2)

NO.	Function	I/O
1	A+	Input
2	A-	Input
3	B+	Input
4	B-	Input
5	Z+	Input
6	Z-	Input
7	5VDC	Output
8	GND	Output
9	F_GND	---
10	F_GND	---

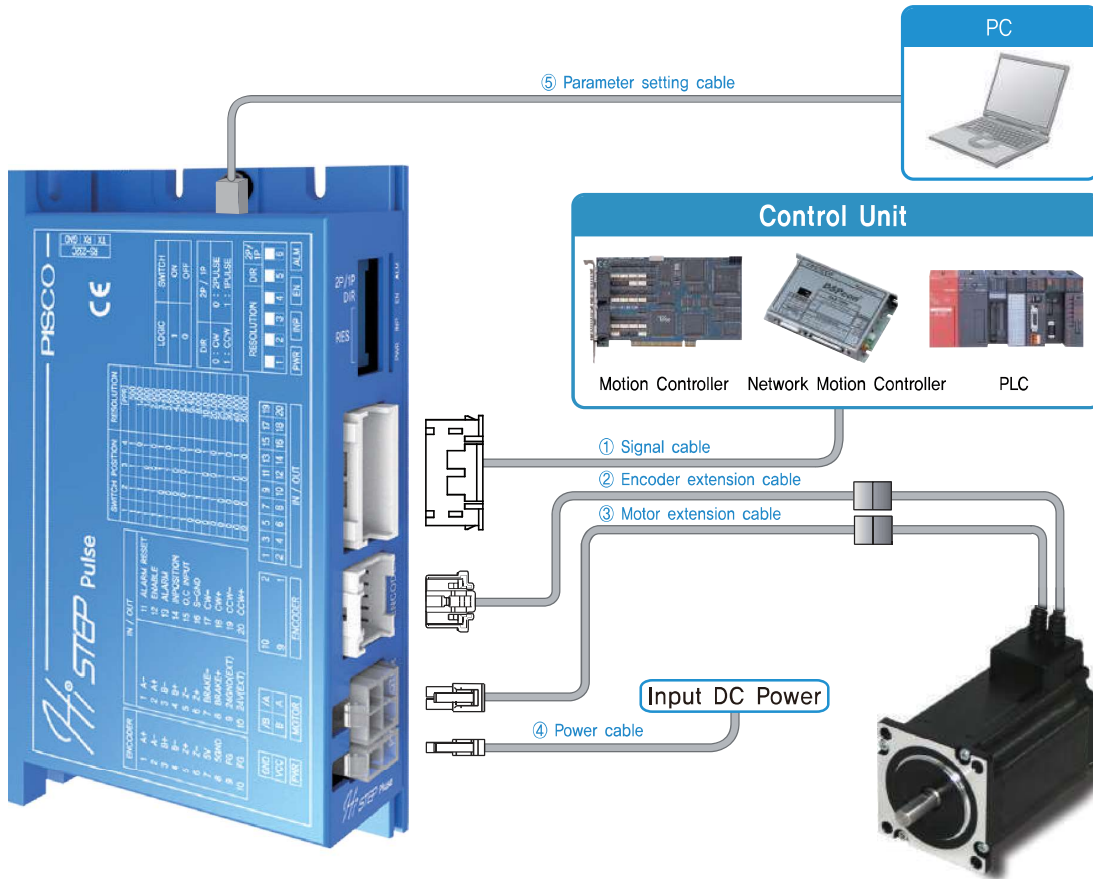


9. Parameter Setting Connector(CN5)

NO.	Function	I/O
1	Tx	Output
2	Rx	Input
3	GND	---



System Configuration [HiSTEP Pulse series]



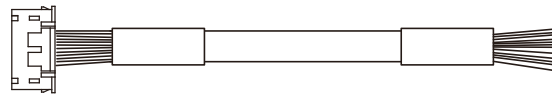
Type	Signal Cable	Encoder Cable	Motor Cable	Power Cable	Parameter Setting Cable
Length supplied	—	30cm	30cm	—	—
Max. Length	20m	20m	20m	2m	3m

1. Options

① Signal Cable

Item	Length [m]	Remark
CSS2-S-□□□F	□□□	Normal Cable
CSS2-S-□□□M	□□□	Robot Cable

□ is for Cable Length. The unit is 1m and Max. 20m length.

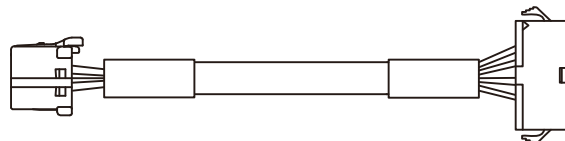


Manufacturer : JST
Housing : PADP-20V-1-S
Terminal : SPH-002T-P0,5L

② Encoder Extension Cable

Item	Length [m]	Remark
CSVO-E-□□□F	□□□	Normal Cable
CSVO-E-□□□M	□□□	Robot Cable

□ is for Cable Length. The unit is 1m and Max. 20m length.



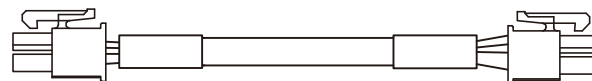
Manufacturer : MOLEX
Housing : 51353-1000
Terminal : 56134-9000

JST : Manufacturer
SMP-09V-NC : Housing
SHF-001T-0,8BS : Terminal

③ Motor Extension Cable

Item	Length [m]	Remark
CSV0-M-□□□F	□□□	Normal Cable
CSV0-M-□□□M	□□□	Robot Cable

□ is for Cable Length. The unit is 1m and Max. 20m length.



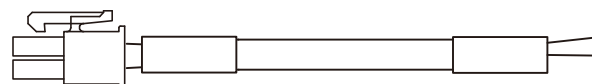
Manufacturer : MOLEX
Housing : 5557-04R
Terminal : 5556T

MOLEX : Manufacturer
5557-04R : Housing
5556T : Terminal

④ Power Cable

Item	Length [m]	Remark
CSV0-P-□□□F	□□□	Normal Cable
CSV0-P-□□□M	□□□	Robot Cable

□ is for Cable Length. The unit is 1m and Max. 2m length.

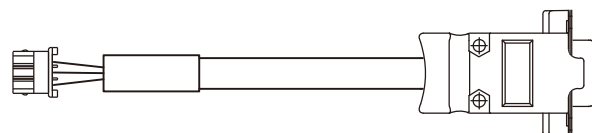


Manufacturer : MOLEX
Housing : 5557-02R
Terminal : 5556T

⑤ Parameter Setting Cable

Item	Length [m]	Remark
CBTS-C-□□□F	□□□	Normal Cable

□ is for Cable Length. The unit is 1m and Max. 3m length.



Manufacturer : MOLEX
Housing : 5264-03
Terminal : 5263

AMPHENOL : Manufacturer
L177SDE09S : Connector
17E-1657-09 : Backshell

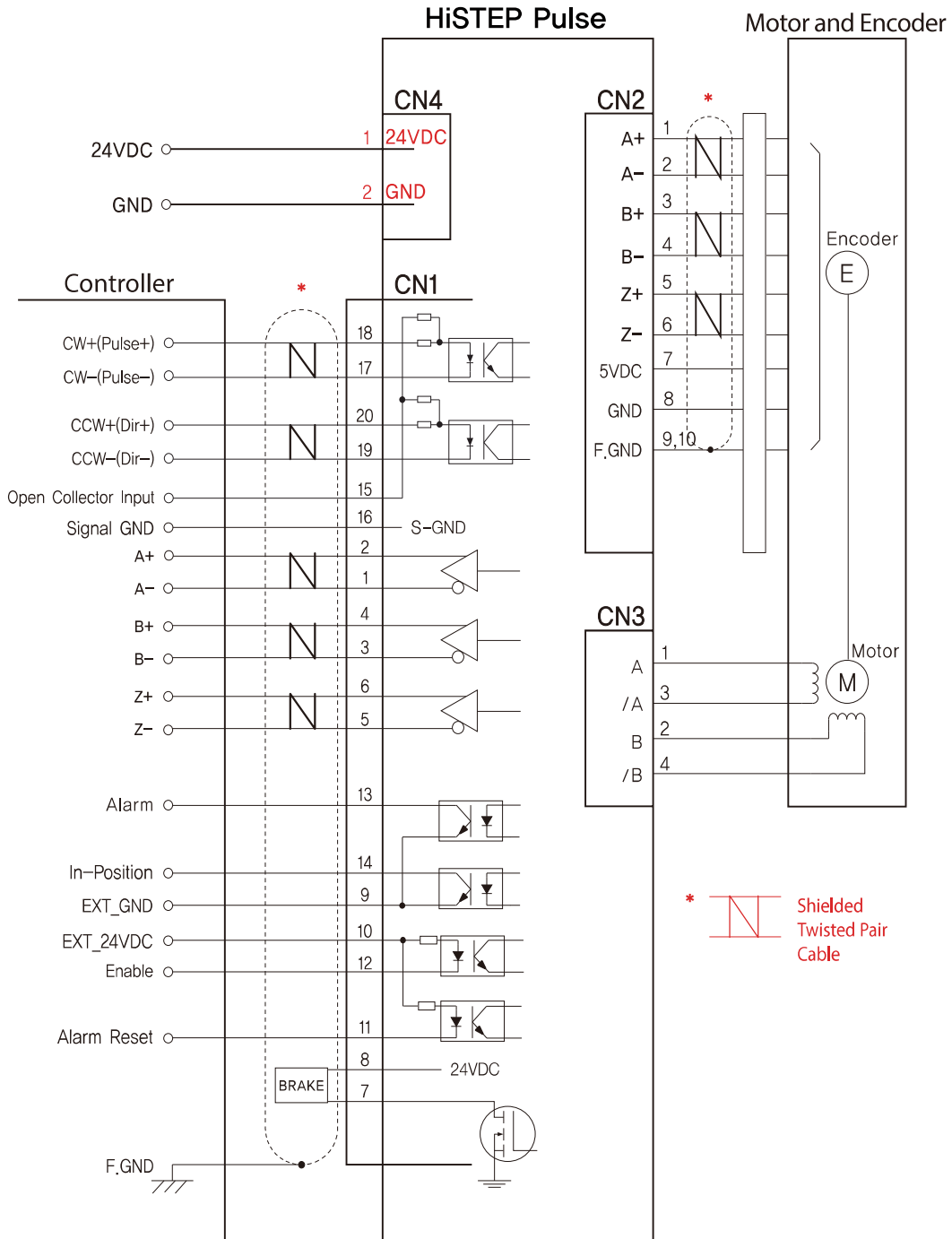
2. Connector Specifications

Connector specifications for cabling to drive.

Purpose	Item	Part Number	Manufacturer
I/O (CN1)	Housing Terminal	PAPD-20V-1S SPH-002T-P0.5L	JST
Encoder	Drive Side (CN2)	51353-1000 56134-9000	MOLEX
	Encoder Side	SMP-09V-NC SHF-001T-0.8BS	JST
Motor	Drive Side (CN3)	5557-04R 5556T	MOLEX
	Motor Side	5557-04R 5556T	MOLEX
Power (CN4)	Housing Terminal	5557-02R 5556T	MOLEX

* Above connector is the most suitable product for the drive applied. Another equivalent connector can be used.

External Wiring Diagram [HiSTEP Pulse]



※ When connects I/O cable between controller and drive, please turn off the power of both controller and drive, in order to protect the drive from any damage.

CAUTION
Please refer to the Manual when connects motor extension cable.
Careful connection will be required to protect the drive from any damages.